APRIL 10, 1937

THE LANCET

Offices: 7, ADAM STREET, ADELPHI, W.C.2.

Telegrams: LANCET, RAND, LONDON. Telephone: TEMPLE BAR 7228 and 7229.

No. XV., OF VOL. I., 1937. LONDON, SATURDAY, APRIL 10, 1937. Pp. 128—Price 1s.
No. 5928. VOL. CCXXXII. Founded 1823. PUBLISHED WEEKLY. Registered as a newspaper. Annual Subscription: Inland £2 2s. Abroad £2 10s.

MARRIAGE AND PERIODIC ABSTINENCE
AN EXPLANATION OF THE NATURAL METHOD OF FAMILY REGULATION
By J. G. H. HOLT, M.D.
Ex-Chief of Staff of the Department of Obstetrics and Gynæcology of the University of Utrecht.
8s. 6d. net
¶ *Prospectus will be sent post free, on application to* Longmans Green & Co. Ltd., 39, Paternoster Row, London, E.C.4

By H. CRICHTON-MILLER, M.A., M.D., M.R.C.P., Hon. Senior Physician, Inst. of Med. Psychology.
INSOMNIA. An Outline for the Practitioner.
Edward Arnold & Co., 41–43, Maddox-st., W.1. Price 10s. 6d.

PSYCHO-ANALYSIS AND ITS DERIVATIVES.
Thornton Butterworth, Ltd., 15, Bedford-st., W.C.2, Price 2s. 6d.

2nd Edn. 490 pp. 14 Plates. 297 Illus. 30s. net, post. 6d.
CYSTOSCOPY AND UROGRAPHY.
By JAS. B. MACALPINE, F.R.C.S.
"A credit to British surgery."—BRIT. JNL. OF SURGERY.
Bristol: John Wright & Sons Ltd. London: Simpkin Marshall Ltd.

FRACTURES.
By MEURICE SINCLAIR, C.M.G., M.B., CH.B. (EDIN.).
With an Introduction by Sir ROBERT JONES, Bt., F.R.C.S.
Pp. 550. 337 X ray photographs, photographs and diagrams. 24s. net.
Constable & Co., Ltd. London.

FOURTH EDITION. Completely revised. 10s. 6d. net.
TREATMENT OF DISEASES OF THE SKIN
By KNOWSLEY SIBLEY, M.A., M.D., B.Ch. (Camb.).
London: Edward Arnold & Co., 41 and 43, Maddox-street, W.1.

DISEASES OF THE THYROID GLAND
WITH SPECIAL REFERENCE TO THYROTOXICOSIS.
By CECIL A. JOLL, M.S., B.Sc., F.R.C.S. (Eng.).
Crown 4to. Fully Illustrated. £3 3s. net.
Revista de Libros: "This book is the best clinical treatise which we possess to-day on the pathology of the thyroid. . . . The excellence of the text is greatly enhanced by the illustrations."
William Heinemann (Medical Books) Ltd., 99, Great Russell-street, London, W.C.1.

OESOPHAGEAL OBSTRUCTION:
ITS PATHOLOGY, DIAGNOSIS AND TREATMENT
(including four chapters on Cancer of the Œsophagus).
By A. LAWRENCE ABEL, M.S. Lond., F.R.C.S. Eng., Assistant Surgeon to the Cancer Hospital, &c.
Pp. 245. 132 Illustrations. 2 Col. Plates. 30s. net.
"Masterful and complete. . . Cannot be too highly praised."
—SURG. GYN. AND OBSTET. JOUR.
Oxford University Press, Amen House, London, E.C.4.

2nd Ed., fully revised, in 1 Vol., 854 pp. 811 Illustrations.
EMERGENCY SURGERY. 50s. net; postage 8d.
By HAMILTON BAILEY, F.R.C.S.
BRISTOL: JOHN WRIGHT & SONS LTD. LONDON: SIMPKIN.

DIATHERMY
INCLUDING DIATHERMOTHERAPY AND OTHER FORMS OF MEDICAL AND SURGICAL ELECTROTHERMIC TREATMENT
Third Edition.
By ELKIN P. CUMBERBATCH, M.A., B.M. (Oxon.), D.M.R.E. (Camb.), F.R.C.P. With Nine Collaborators.
Demy 8vo. 168 Illustrations. 21s. net.
Wm. Heinemann (Medical Books) Ltd., 99, Great Russell-street, London, W.C.1.

SECOND EDITION.
UROLOGY IN WOMEN:
A HANDBOOK OF URINARY DISEASES IN THE FEMALE SEX.
By E. CATHERINE LEWIS, M.S. (Lond.), F.R.C.S. (Eng.), Surgeon to the Royal Free Hospital; Surgeon and Urologist to the South London Hospital for Women.
¶ "*This book should certainly make and keep for itself a place in urological literature.*"—LANCET.
Pp. viii + 100. With 4 Coloured Plates and 27 other Illustrations. Price 6s.; postage 5d.; abroad 9d.
Baillière, Tindall & Cox, 7 & 8, Henrietta-street, London, W.C.2.

BY KENNETH M. WALKER, F.R.C.S., M.A., M.B., B.C.
DISEASES OF THE MALE ORGANS OF GENERATION.
Pp. 246. Coloured Plate and 78 Illustrations. 12s. 6d. net.
(Oxford University Press.)
THE ENLARGED PROSTATE.
New and Enlarged Edition. Pp. 223. Coloured Plate and 62 Illustrations. Price 14s. net. (Oxford University Press.)
SEX DIFFICULTIES IN THE MALE. (Second Edition.) 5s. net. (Jonathan Cape.)
PREPARATION FOR MARRIAGE. (Jonathan Cape.)
"Should be in the possession of every medical man."
—GLASGOW MEDICAL JOURNAL.

URINARY SURGERY.
A Handbook for the General Practitioner.
By W. K. IRWIN, M.D., F.R.C.S.
Surgeon, St. Paul's Hospital for Genito-Urinary Diseases.
"Clearly written . . . furnishes the practitioner with information of great practical value in his everyday work."—BRIT. MED. JOUR.
SECOND EDITION, REVISED AND ENLARGED.
Price 10s. 6d. (postage 6d.).
Baillière, Tindall & Cox, 7 & 8, Henrietta-street, London, W.C.2.

PROGNOSIS.
VOLUME ONE. Price 10s. 6d. net (postage 6d. extra).
Companion Volumes to the "Modern Technique in Treatment" and "Clinical Interpretation of Aids to Diagnosis" Series.
The first 66 articles of this series have been collected in book form. The Volume comprises 384 Demy Octavo pages, and is fully indexed under titles, authors, and broadly classified into groups to facilitate quick reference.
VOLUME II IN THE PRESS
See Special Announcement Pages 6 & 7.
The Lancet Limited, 7, Adam-street, Adelphi, London, W.C.2.

★ *Books for Modern Practice* ★

4 Coloured Plates and 234 Text-figures. 18s.
TEXTBOOK OF GYNÆCOLOGY
By WILFRED SHAW, M.D., F.R.C.S., F.C.O.G.,
Asst. Physician Accoucheur, St. Bartholomew's Hospital, London.

THE SCIENCE AND PRACTICE OF SURGERY
By W. H. C. ROMANIS, M.B., F.R.C.S., and PHILIP H. MITCHINER, M.S., F.R.C.S. *5th Edition.* 758 Illustrations. Two Volumes. 28s.

APPLIED PHARMACOLOGY
By A. J. CLARK, M.D., F.R.C.P., F.R.S. *5th Edition.* 73 Illustrations. 18s.

MEDICINE: Essentials for Practitioners and Students
By G. E. BEAUMONT, D.M., F.R.C.P. *2nd Edition.* 61 Illustrations. 21s.

A SYNOPSIS OF HYGIENE
By W. WILSON JAMESON, M.D., F.R.C.P., D.P.H., and G. S. PARKINSON, D.S.O., D.P.H., Lt.-Col. R.A.M.C. (retd.). *5th Edition.* 17 Illustrations. 21s.

J. & A. CHURCHILL Ltd., 104 Gloucester Place, LONDON W.1

"To my patients probably the most appreciated drug which we have come to use frequently in the last two years is ergotamine tartrate which in most cases will bring prompt relief to sufferers from migraine."

Professor W. C. Alvarez (Mayo Clinic)
Clin. Med. & Surg., Jan., 1937.

MIGRAINE

Clinical experience of recent years has provided ample proof of the fact that no other drug has given results so uniformly successful as has FEMERGIN (ergotamine tartrate) in the treatment of migraine. Even patients who have long been subject to migraine attacks, often of great severity, have in the majority of cases obtained almost miraculous relief following the administration of FEMERGIN.

FEMERGIN is most effective when given early in an attack, but even fully developed seizures are often relieved in one or two hours. The dosage should be varied to find the smallest amount that will be effective, but generally 0·25 to 0·5 c c. by hypodermic injection will suffice to abort or cut short an attack. In mild cases satisfactory relief may be obtained from oral administration.

Further particulars from—

J. FLINT **SANDOZ PRODUCTS**
134, WIGMORE STREET, LONDON, W.1

APRIL 10, 1937

THE LANCET

A JOURNAL OF BRITISH AND FOREIGN MEDICINE, SURGERY, OBSTETRICS, PHYSIOLOGY, CHEMISTRY, PHARMACOLOGY, PUBLIC HEALTH, AND NEWS

No. 5928 LONDON: SATURDAY, APRIL 10, 1937 CCXXXII

CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT

ADDRESSES AND ORIGINAL ARTICLES

Pathology of the Adrenal Gland in Relation to Sudden Death. By C. K. SIMPSON, M.D.—(*Illus.*) 851

Diphtheritic Myocarditis: An Electrocardiographic Study. By N. D. BEGG, M.D.—(*Illus.*) 857

Action of Corpus Luteum Hormone on the Human Menstrual Cycle. By T. N. MORGAN, M.D., and S. G. DAVIDSON, F.R.C.S.—(*With charts*) 861

Drip Blood Transfusion in Severe Prolonged Hæmorrhage. By A. W. CUBITT, F.R.C.S. 864

Cysticercosis as a Cause of Epilepsy in a Diabetic Indian. By R. L. H. MINCHIN, M.D.—(*Illus.*) 865

Acute Parotitis as a Manifestation of Latent Uræmia. By R. T. PAYNE, F.R.C.S. 867

CLINICAL AND LABORATORY NOTES

Tuberculous Vulvovaginitis. By V. A. J. SWAIN, M.R.C.S. 868

Bilateral Cystic Swellings of the Thighs of Tuberculous Origin. By E. A. DEVENISH, F.R.C.S.—(*Illus.*) 869

Case of Streptococcal Meningitis Treated with Prontosil. By I. VITENSON, M.R.C.S., and G. KONSTAM, M.R.C.P. 870

MEDICAL SOCIETIES

Royal Medico-Chirurgical Society of Glasgow: Exhibition of Cases 871

REVIEWS AND NOTICES OF BOOKS

Ions in Solution. By R. W. Gurney, M.A. 872

Morphologische Pathologie. By Prof. Dr. W. Hueck 872

Venereal Disease. By D. Lees, F.R.C.P. Edited by R. Lees, F.R.C.P. 872

La vésicule biliaire et ses voies d'excrétion. By Prof. M. Chiray, I. Pavel 873

Studies in Cardiovascular Regulation. By Prof. G. V. Anrep, M.D., F.R.S. 873

Practical Physiological Chemistry. By G. M. Wishart and others 873

Laboratory Experiments in Physiological Chemistry. By Prof. A. K. Anderson, Ph.D. 873

Physical Diagnosis. By Prof. R. H. Major, M.D. 873

Physical Therapeutic Methods in Otolaryngology. By A. R. Hollender, M.D. 874

Rural Health Practice. By H. S. Mustard, M.D. 874

LEADING ARTICLES

PSYCHIATRY IN VOLUNTARY HOSPITALS 875

INFECTION THROUGH THE OLFACTORY MUCOSA 875

VOX POPULI 876

ANNOTATIONS

A Question of Neighbourliness 877

Anæmia and the Pituitary 877

Physical Efficiency and Fatigue 877

Drainage of the Peritoneal Cavity 878

Vitamin-B Deficiency and the Heart 878

Judgment and Reason 879

Uretero-intestinal Implantation 879

Respiratory Efficiency 879

Tumours of the Hand 880

Cancer of the Lung 880

A Conflict of Philosophies 880

A National Food Policy 881

What is Osteopathy? 881

A Directory of London Municipal Hospitals 882

Rockefeller Travelling Fellowships 882

Food and Exercise 882

THE SERVICES

Royal Naval Medical Service—Army Medical Services — Royal Army Medical Corps—Royal Air Force—Deaths in the Services 895

PRINCIPLES OF MEDICAL STATISTICS

XV—General Summary and Conclusions 883

SPECIAL ARTICLES

Micro-chemical Methods of Blood Analysis. By E. J. KING, Ph.D., G. A. D. HASLEWOOD, M.Sc., and G. E. DELORY, B.Sc.—(*With chart*) 886

Special Units of the L.C.C. Hospital Service 893

United States of America: Report on Medical Care 894

Scotland: Discoverer of Ether Anæsthesia 894

Ireland: Medical Attendance on the Civic Guard 895

An Orthopædic Nursing Certificate 885

GRAINS AND SCRUPLES

From a Taddygaddy (II) 896

PANEL AND CONTRACT PRACTICE

Black-coated Workers—Mixed Partnerships 897

PUBLIC HEALTH

1936 in Scotland — An Epidemic and the Public 898

Infectious Disease in England and Wales 906

CORRESPONDENCE

Over-treatment of Gonorrhœa (Dr. A. M. Simpson) 899

Who Invented the Idea of Tarring Roads? (Dr. R. S. Creed, Dr. A. L. Vischer) 899

Athletics for Women (Dr. Adolphe Abrahams) 899

Colour Perception Tests (Dr. C. E. R. Norman) 900

The Ætiology of Pellagra (Miss Harriette Chick, D.Sc.) 900

Immunisation of Men—and Animals 900

NEW INVENTIONS

A Modified Rectal Bougie. By J. P. LOCKHART-MUMMERY, F.R.C.S.—(*Illus.*) 874

PARLIAMENT

Question Time: Duties of Coroners — Medicine Stamp Duties 901

OBITUARY

Charles Coley Choyce, F.R.C.S.—(*With portrait*) 902

Alexander Corsar Sturrock, M.R.C.P. 903

Joseph Pereira Gray, M.R.C.S. 903

Gilbert Cochrane, M.B. 903

George Herbert Spencer, M.R.C.S. 904

MEDICAL NEWS

Royal College of Surgeons 904

Society of Apothecaries 904

University of Aberdeen 904

University of Dublin 904

University of Sheffield 904

University of Birmingham 904

Institute of Medical Psychology 904

British Health Resorts Association 904

St. George's Hospital 904

Mothers' Clinics 904

Royal Institution 905

Queen's University Club 905

Univ. of London Medical Graduates Society 905

Ophthalmological Lectures at University of Glasgow 905

Preventive Prediatrics 905

Nat. Assoc. for Prev. of Tuberculosis 905

Fellowship of Medicine 905

A Congress on Hormones 905

Nat. Inst. of Industrial Psychology 905

King's College Hospital 905

Progress of Cremation 905

NOTES, COMMENTS, AND ABSTRACTS

Music in the Factory 908

Noisy Motor Vehicles 909

Guidance to Careers 909

The Stayput Bed Support—(*Illus.*) 909

A Classical Manual on Child Welfare 909

Medical Activities for Lay Readers 910

New Preparations: Acrosone—Biliron—Solusepta-sine—Viteolin—Orheptal 910

Appointments 906

Vacancies 906

Medical Diary 907

Births, Marriages, Deaths 910

THE LONDON AND COUNTIES MEDICAL PROTECTION SOCIETY LIMITED

(FOUNDED 1892)

President: Sir CUTHBERT S. WALLACE, K.C.M.G., C.B., P.R.C.S.

Trustees for the Reserve Fund:

Rt. Hon. LORD DAWSON, P.C., G.C.V.O., K.C.B., M.D., P.R.C.P.

Sir SQUIRE SPRIGGE, M.D., F.R.C.P., F.R.C.S. Sir NORMAN G. BENNETT, M.A., M.B., B.Ch., L.D.S.

The Society was founded for the following purposes: To protect, support, and safeguard the character and interests of legally qualified Medical and Dental Practitioners; to advise and assist Members of the Society in matters affecting their professional character and interests; and to indemnify them in respect to actions, etc., undertaken on their behalf.

The Society is insured with Lloyd's Underwriters to an UNLIMITED extent in respect of all adverse costs and damages awarded against Members in any action which the Society undertakes on their behalf.

Annual Subscription: £1. Entrance Fee: 10s. Assets exceed £70,000.

No entrance fee to those joining within 12 months of registration.

Full particulars and forms of application for membership from the Secretary, Victory House, Leicester Square, W.C.2.

Telephone: GERRARD 4814.

You must read

WHO'D BE A DOCTOR?

ANTHONY WEYMOUTH

8s. 6d. net

The author of this brisk, informative and highly entertaining narrative is already well known as a writer of crime-stories.

"Dietetic fads, medical etiquette, the reason why people make 'spoonerisms,' and the fact that blondes require larger doses of a certain drug than brunettes, are among the subjects dealt with in this autobiography of a doctor. The author's pen-name hides the identity of a London specialist."

—*Morning Post.*

RICH & COWAN

The Prescriber

A Review of the Progress of Medical Science

Published MONTHLY—20s. per annum, post free

APRIL, 1937—**ANÆSTHESIA**

Price 2s., post free.

KEEP "THE PRESCRIBER" ON YOUR DESK.

THE PRESCRIBER OFFICES, 65, Castle Street, EDINBURGH, 2

STAMMERING, SPEECH DEFECTS.

BEHNKE METHOD. Estab. 1880. CASES, non-resident, treated at 39, Earl's Court-square, S.W.5, and, in residence, in the Summer Holidays at Miss Behnke's house on the Chilterns.

"Pre-eminent success in the education and treatment of stammering and other speech defects."—*The Times.*

"Thoroughly physiological principles."—*The Lancet.*

"The method is scientifically correct and perfectly effective."—*Guy's Hospital Gazette.*

"STAMMERING, CLEFT PALATE, SPEECH LISPING." 3s. 9d. of Miss BEHNKE, 39, Earl's Court-square, S.W.5.

SCOTT'S

PATENT MALT

CHARCOAL BISCUITS

Are not only

DELICIOUS

but relieve

INDIGESTION

CONSTIPATION

FLATULENCE and ACIDITY.

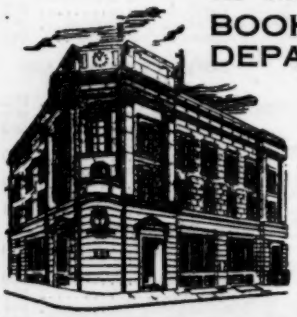
TINS 9d. & 2/-

Made only by

R. M. SCOTT (IPSWICH) LTD.

Estd. 1879. IPSWICH, ENGLAND.

H. K. LEWIS & Co. Ltd., Publishers and Booksellers



BOOKSELLING DEPARTMENT } TEXTBOOKS and Works in Medical, Surgical, and General Science. FOREIGN BOOKS.

STATIONERY DEPARTMENT.—Special Stock of Medical Stationery, Card-Index Systems, Filing Cabinets, Name Plates, Notebooks, etc. Hand-painted Shields of the Arms of Universities, Hospitals, and Colleges. All Students' Requisites.

MODELS DEPARTMENT.—Anatomical Models, Charts, Osteology, etc.

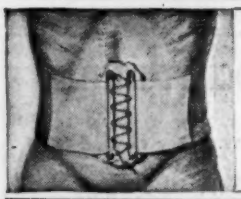
MEDICAL AND SCIENTIFIC LENDING LIBRARY

Annual Subscription, from ONE GUINEA. *Prospectus on application.*

SECOND-HAND BOOKS DEPARTMENT: 140 GOWER ST., W.C.1

London: H. K. LEWIS & Co. Ltd., 136 Gower Street, W.C.1.

Telegrams: "PUBLICAVIT, WESTCENT, LONDON." *Telephone:* EUSton 4282 (5 lines).



THE EXPEDO FASTENER

THE NEW METHOD OF BANDAGING. Pat. No. 436888

Single piece of stout material for abdomen, limbs, etc. or by plaster (as illustrations). Little or no disturbance to patient. Rapid and easy access to wound; approximation of wound edges. Great saving in material and time; Non-rusting—Sterilizable. *Descriptive booklet on request.*

ALEXANDER & FOWLER, PEMBROKE PLACE, LIVERPOOL.

JENNER INSTITUTE Glycerinated VACCINE LYMPH

PREPARED IN ACCORDANCE WITH THE THERAPEUTIC SUBSTANCES REGULATIONS (BRITISH PRODUCT)

Telephone: BATTERSEA 1347.

SINGLE VACCINATION TUBES - - 8d. each; 7s. dozen. Postage 1½d. extra.
LARGE TUBES (EXPORT Only) sufficient for 5 vaccinations, 1s. 3d. each; 12s. dozen.

SOLE AGENTS FOR SCLAVO'S ANTI-ANTHRAX SERUM.

Telegrams: "JENVACTER, PHONE, LONDON" (2 words).

JENNER INSTITUTE FOR CALF LYMPH LTD., 73, Church Road, Battersea, S.W.11.

ADDRESSES AND ORIGINAL ARTICLES

PATHOLOGY OF THE ADRENAL GLAND IN RELATION TO SUDDEN DEATH *

BY C. KEITH SIMPSON, M.D. Lond.
ASSISTANT LECTURER IN FORENSIC MEDICINE AT GUY'S HOSPITAL

Two factors have elevated the adrenal gland to its present-day importance in medicine. One was the publication by Addison of his famous "blue book," for this prompted Brown-Sequard to perform experimental extirpation of the gland for the first time, and to study the characteristic manner in which death inevitably followed. The other factor is the renaissance of endocrinology which has taken place in recent years.

Sufficient scientific fact now invests our knowledge of the relations of this gland to the maintenance of life to enable a discussion of its relation also to sudden death from natural causes to be effected without recourse to vague theory. The conditions of sudden death, however, give the problem a distinctly forensic flavour, and tend to limit the experience to those engaged in this work. Even here the figures are not impressive; it has been my experience to examine such cases at the rate of 1 in every 500 post-mortem examinations of subjects of sudden death from all causes, including injuries.

Nevertheless the morbid anatomy of these glands with strict relation to sudden and unexpected death is a subject remarkably well defined; the figures are small, but the limitation in disease processes is close. There are few morbid processes which result in the rapid destruction of the essential cortical element of both glands more or less simultaneously, and these are the conditions of sudden death.

Development

In order properly to appreciate the effects of disease of the adrenal glands, it is necessary to summarise certain of the facts known about their developmental anatomy and physiology.

Mammals alone possess the permanent enveloping relation of the cortex to the medulla seen in man (Fig. 1), although the presence of the essential cortical tissues is universal, as a distinct organ in the whole range of amniota—mammals, birds, and reptiles—and as a homologue, the inter-renal tissue, in all anamniota as low as hags and lampreys. The arrangement in layers of this cortical element varies, but its essential characters are constant.

In addition to this characteristic cellular cortex, there is developed in mammals a third element, a layer of cells deep to the true cortex, and apparently concerned solely with the development of masculine character (Fig. 1). Now at birth the weight of the adrenal gland is as much as a quarter that of the corresponding kidney; it becomes approximately a thirtieth of the weight of the kidney in adult life. This relatively large organ consists of a thin lamina of true cortex, a wide zone of this third element, the androgenic "masculinising" tissue, and a small medulla. Immediately after birth there occurs a degeneration of the entire androgenic zone, accompanied by an intense hyperæmia. This may indeed prove the cause of a fatal catastrophe, destructive hæmorrhage taking place as a complication of this intense hyperæmic state. Reorganisation of the remains of this androgenic tissue normally takes place during the first year, and thereafter the element exists only as a thin lamina, coming into prominence on the rarest occasions as a malignant masculinising tumour of the cortex of one gland.

It is clear that, except for the one short post-natal period during which the androgenic zone is undergoing its hyperæmic involution, there is no period of life at which this tissue has any part to play in the causation of sudden death. It is entirely androgenic, displaying an activity confined to sexual development.

FIG. 1.—The normal histology of the gland. D, the capsule. B and C, the adult cortex. The fœtal cortex—the androgenic zone—is the pigmented layer separating B from the medulla A.

During the development of the true cortex, a free vascular circulation develops, the arterial tree ramifying in the capsule of the glands and sending from this plexus numerous capillaries, which penetrate into the medulla to open out into sinusoids from which venous drainage takes place. The significance of this rather unusual distribution of vessels lies in the predisposition to the impaction of arterial emboli, perhaps particularly emboli of malignant cells, and therefore to the development of secondary lesions. The matter will be discussed more fully in dealing with the morbid anatomy of the glands.

So far as the preservation of life is concerned, attention may be directed solely to the cortex, for that this is the essential element in the gland has been proved beyond all conceivable doubt by experimental extirpation. As to how much of one remaining cortex is required to stave off signs of deprivation, experimental opinion varies. Excision of one gland and either cautery (Crowe and Wislocki 1914, Biedl 1910) or denervation (Pende 1923, Stewart and Rogoff 1929) of the remaining medulla shows survival to be possible provided that from one-fourth (Bornstein and Gremels 1925) to one-eleventh (Langlois 1898) of the remaining cortex also survives intact. Administration of extracts of the cortex to adrenalectomised animals, doomed otherwise to die, retains for them conditions of physiological health which can be maintained almost indefinitely.

Relatively little attention has ever been paid to the question whether the adrenal cortex can regenerate sufficiently and with a rapidity necessary to prevent the development of insufficiency; any process resembling regeneration is seen so rarely in company

* The Erasmus Wilson lecture delivered to the Royal College of Surgeons on March 15th.

with disease of the organ itself. In the most careful survey yet made MacKay and MacKay (1932) show that hyperplasia of the cortex of one gland does occur after operative excision of the other, but that it is an inactive process, except perhaps in the rat, takes nearly three months to develop, and requires the most encouraging conditions—conditions which do not hold when disease is present. As a natural process, therefore, it need not occupy further attention. In so far as it concerns rapid destruction of the glands, regeneration is far too slow and uncertain to play any part in staving off insufficiency.

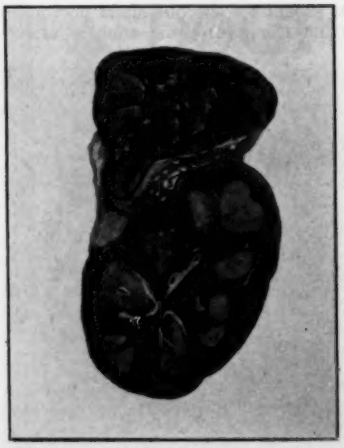


FIG. 2.—Hæmorrhagic infarction of the adrenal gland *and* the kidney in a newborn infant.

One further matter requires consideration. Accessory cortical tissue, occurring with some frequency in most animals, has been remarked upon with particular prominence in those of greatest bulk, including man, but it remains that accessory masses of true cortex—not androgenic—are uncommon, and when present never large enough to play any appreciable part in preventing fatal deprivation in the event of total destruction of both glands. My own records of the last 2500 cases contain descriptions of two examples, one of which was a complete heterotopia of the cortical element of that side. The irregular cortical "hyperplasias" of advanced years are of course of no functional significance in this respect.

Pathological Anatomy

Pathological changes in the body after death from acute insufficiency of the cortex are, for practical purposes, limited to those by which the gland itself is destroyed. It is true that dilatation of the heart, congestion of the lungs or pancreas or other organs, and the presence of bile in the gastric contents have been noted in addition, and even credited with some significance in relation to these deaths, but these are general findings and all too common to merit any such distinction. The systemic reflections of cortical insufficiency are almost entirely biochemical and attended by functional disorder rather than by any structural change visible to the eye.

Even in the gland itself there are but few morbid processes to be found with any frequency under these conditions; three are commonly seen, others rarely, and it is to these three that I wish to give attention. They are hæmorrhagic necrosis or hæmorrhagic infarction, acute caseative tuberculosis, and rapid metastatic growth invasion of the gland.

HÆMORRHAGIC NECROSIS OR INFARCTION

The adrenal glands are the site of hæmorrhage, often extensive, at two periods during life.

Neonatal type.—A tendency to hæmorrhage first occurs during the hours and days immediately following birth (Levinson 1935), and as already explained, this is a misadventure which complicates the intense hyperæmia accompanying physiological involution of the androgenic (fœtal) cortex. It may occur irrespective of the nature or rapidity of delivery, but appears to be rather more frequent after difficult, precipitate, or forceps deliveries. It is properly attributed, under these conditions, to the added venous engorgement natural to such occasions, and is the more likely to provoke hæmorrhage in that it develops rapidly. Krause (1927) draws attention to the effects also of traction on the hilum of the gland, and of contraction of the musculature of the suprarenal veins which may follow traction, both increasing venous engorgement and adding to the already serious strain on the sinusoidal and capillary walls. As Landau (1912) has, however, quite rightly pointed out, the process is primarily a physiological one, and not due to any variety of birth trauma alone. It may develop in the most carefully delivered Cæsarean sections. Both under these conditions and also under those responsible for hæmorrhage in later years, the extravasation of blood may break out through the capsule of the gland into the surrounding connective tissues, accentuating the shock-like

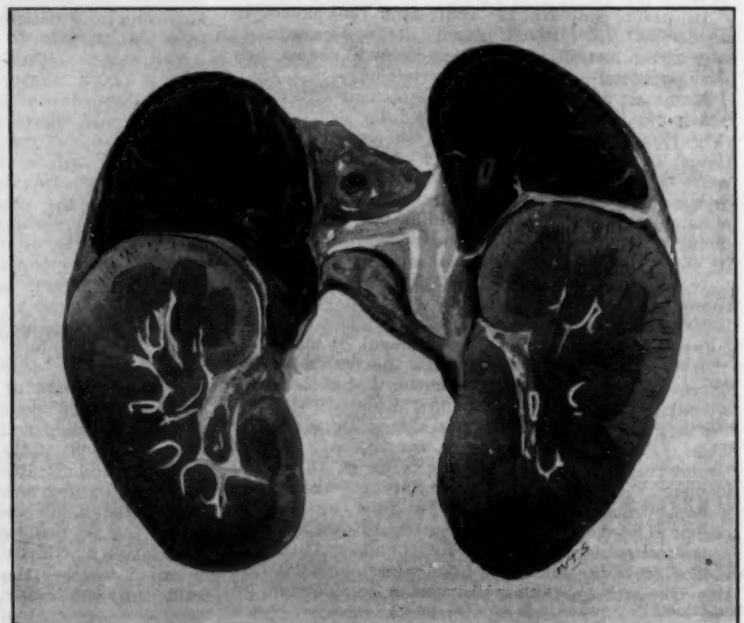


FIG. 3.—Acute hæmorrhagic necrosis of both adrenal glands in a girl aged 10 months following streptococcal septicæmia after pneumonia.

character of the collapse which follows. The symptoms are often remarked to be identical with those of an acute upper abdominal crisis.

There is, too, another complication which is not perhaps so remarkable as it is often overlooked. Thrombosis of the adrenal veins often accompanies the effusion of blood into the substance of the gland. The vein is, after all, in close communication with sinusoids in which thrombosis has already occurred, it is a short vein, half buried in the substance of a gland swollen and tense as the result of its distension by blood, and therefore most likely to become compressed, adding stasis to the factors already encouraging thrombosis.

The process of thrombosis may also extend to involve the renal vein, especially on the left side where the suprarenal and renal veins unite before entering the inferior vena cava. An example of this occurred under the following circumstances:—

A primigravida of 35 had a normal pregnancy interrupted only at the thirty-seventh week by an attempted external version. The procedure was unsuccessful and at term delivery by a breech presentation took place, being rendered additionally difficult by reason of extended legs, and demanding final extraction under anæsthesia. At birth the child was alive though pale and rather shocked; it lived for 9 hours without causing alarm, though it remained pale and cold. It collapsed quite suddenly, without either convulsions or cyanosis, about 9½ hours after delivery.

Post mortem there were no abnormalities beyond these shown in the adrenal gland and kidney (Fig. 2). Each side was affected similarly, and thrombosis of both adrenal and renal veins was to be demonstrated microscopically.

FIG. 4.—Acute tuberculosis of the adrenal gland in a man aged 22.

A further specimen of the condition is shown in the Royal College of Surgeons' museum (Spec. No. 9294.1), the presentation in this case being a vertex; there are no records of the other points of interest.

Purpuric type.—A second form of hæmorrhagic necrosis, also frequently attended by thrombosis of the attendant veins, occurs at later periods of life, when the androgenic zone hyperæmia has subsided, and takes place from entirely different causes unconnected with any physiological process. As a consequence of the development of a purpuric (hæmorrhagic) tendency of whatever cause, but more particularly following septicæmia — especially streptococcal — meningitis, pneumonia, and diphtheria, the most extensive primary hæmorrhages may occur into the substance of the adrenal gland of either one, or more usually both sides, disrupting its substance entirely and frequently distending the capsule to extraordinary proportions. When the process is symmetrical both cortices are destroyed with the greatest rapidity and acute adrenal insufficiency quickly develops. The condition is well illustrated by the following case:

A girl of 10 months and without previous illnesses developed a slight cough and became a little feverish. The temperature rose to 101° F. For nearly a week the condition was more or less stationary, then without apparent reason the child became most apathetic, lost appetite, and within 8 hours vomited. Convulsive fits developed 2 hours later and continued intermittently for another 10 hours. Vomiting was repeated during this period. After 20 hours there appeared some respiratory embarrassment and coma developed. The child died suddenly in its mother's arms after 21 hours.

Post mortem there was a well-developed acute hæmorrhagic pneumonia of streptococcal type, with minute friable vegetations on the mitral valve cusps indicating the spread of infection into the blood stream, and bilateral hæmorrhagic necrosis of the adrenals (Fig. 3). Moderate distension only was present, but no intact cortical element was seen with the naked eye. Microscopical examination of the adrenal veins showed that thrombosis was not developed.

Scheidegger (1933) has described—in a similar case in a boy of 6½ years who died after massive bilateral adrenal hæmorrhages had developed in company with streptococcal meningitis—actual permeation of the capillaries by organisms morphologically identical with those seen in the meninges. The condition is also shown in the R.C.S. museum (Spec. No. 800.2) from a nurse at work in a base hospital in France in 1917.

In this case the infection was meningococcal, lasted 24 hours in all, and was terminated by the development of a coarse purpuric eruption throughout the mucous membranes and skin. The adrenal glands were both disrupted by massive hæmorrhages indistinguishable

FIG. 5.—Massive invasion of the adrenal gland by metastatic carcinoma arising from the stomach in a man aged 55.

from those just described in connexion with streptococcal pneumonia and septicæmia. Examination of smears from the spleen showed numerous Gram-negative diplococci (meningococci); the case was also one of septicæmia.

In *severe burns* the same pathological process is seen with some frequency, especially in medico-legal work. Particularly when extensive, hæmorrhagic necrosis of the adrenal glands may develop with fatal results, in spite of the absence of infection. I have records of cases developing as soon as four hours and as late as seven days after injury. Thrombosis is again fairly frequent. This lesion develops as a result of the combined capillary paralysis and increased capillary permeability taking place during the period of shock following burns. It is to be distinguished from the shock-like crisis accompanying destruction of the adrenal cortices, in which there is no increase in the permeability of the capillaries and no increase in the fluid content of the tissue spaces; in fact there is a progressive dehydration of the tissues. The matter will be referred to again later.

Cystic hæmatomata may also develop, either under conditions in which the capsule bursts and extravasation of clot occurs, or after repeated smaller hæmorrhages, none of which is sufficiently extensive to cause death. One gland alone may be involved. Spec. No. 1912.1 in the R.C.S. museum illustrates this very well.

A woman, aged 44, was in good general health but suffered from occasional pain in the left loin. Five years previously an operation had been performed for a large retroperitoneal hæmatocele, lying in the region of the left kidney and "causing intestinal obstruction." The cavity, evacuated of its blood clot, was marsupialised to the abdominal wall and packed with gauze. None of the cyst wall was removed; recovery was uneventful. The second hæmorrhage was heralded by 12 hours' vomiting, and operation revealed the condition shown. The relation between the first and second hæmatomata was not made clear.

ACUTE CASEOUS TUBERCULOSIS

In the large majority of cases of adrenal tuberculosis the disease, being secondary, pursues an insidious course and is attended by limiting fibrosis and calcification. Addisonian changes have usually become well developed before death takes place. Tuberculosis of the glands is relatively common, accounting for at least some 70 per cent. (Guttman 1930) of cases of Addison's disease, but rapid destruction of the glands on both sides likely to cause acute cortical insufficiency is uncommon. As with growth, arterial embolism is almost certainly responsible for initiation of the disease, rapid caseous necrosis, and often bulky proliferative thickening by soft granulations bringing about a very considerable enlargement of the affected gland. The following case is a good example:

A metal worker, aged 22, arrived home after a game of football complaining of abdominal pain and nausea. He had received no injuries during the course of the match. Vomiting occurred within half an hour of his arrival, and was repeated about 1½ hours later. Shortly after this his wife noted twitching of the face muscles and of the hands, and before assistance could be summoned he had collapsed in a major convulsive fit; intense cyanosis and marked respiratory embarrassment were present, and death took place a few minutes later. The total period of definite illness was less than 3 hours.

Post mortem there was both primary and secondary apical disease of the right lung, both however progressing favourably, and massive soft caseous necrosis of both adrenals (Fig. 4). There was no pigmentation of the skin or mucous membranes, and no evident loss of weight. This was confirmed by the wife who described her husband as having had no illness until the day of his death.

It is especially true of the adrenal gland that with but little primary pulmonary or mesenteric disease there may be the most gross destruction by secondary proliferative and caseous disease (Elsässer 1922). When this is developed rapidly signs and symptoms of acute insufficiency may appear, and as in this case prove quickly fatal. It is of course probable that a minimum of reserve cortex was present for some days or possibly weeks before death suddenly took place; the subject is on the brink of a catastrophe without having knowledge of the fact. The frequency with which exercise, shock, or extreme variations in temperature cause a precipitation of the fatal attack is well known, and will be discussed later.

INVASION BY METASTATIC GROWTH

Although primary malignant growths of both the cortex and the medulla of the gland may result in complete destruction of the cortex of one side, that of the other gland is rarely if ever affected, and

deprivation of both cortices does not occur; sudden death from acute insufficiency is not seen in company with primary malignant growth. Metastatic growth invasion is, however, a process more likely to result in the destruction of both glands, since it is so commonly bilateral. This form occurred in a farm labourer who dropped dead in a field while "stoning" furrows.

He was aged 55 and, so far as was known, had not had any illness for at least 25 years, and had not complained in any way up to the day of his death. He dropped dead whilst moving slowly along a plough furrow, with several companions, removing stones.

Post mortem he was in a condition of perfect health as regards the heart and vasculature, but bore a small ulcerative carcinoma of the body of the stomach, with several glandular infiltrations in the porta hepatis, and adrenal glands having the appearance shown in Fig. 5. There is complete destruction of both cortices, and in the absence of any other cause of death, the primary tumour being small, and other organs being healthy, acute adrenal insufficiency was held to be responsible.

Any organ may give rise to metastases in the adrenal glands, but some appear to do so with striking frequency. Willis (1933) describes deposits in 27 out of 323 consecutive cases of carcinoma growth irrespective of the site of origin, and remarks upon the frequency of deposit from primary tumours of the lungs and breast, and from melanomata. In over a half of these 23 the deposits were bilateral.

It is striking how far the cortex may resist destruction, remaining as a thin lamina stretched out over the growth mass. This fact added to the infrequency of large bilateral deposits is a reasonable explanation of the rarity of deaths clearly from acute adrenal insufficiency in a condition as frequently seen as metastatic deposit in both adrenal glands. Willis, although not interested in the symptomatology of his cases, notes the occurrence of asthenia and vomiting as terminal symptoms of cases showing adrenal deposits at autopsy, but fails to denote their relation to adrenal insufficiency.

Now something of the vascular anatomy of the gland has already been said, with particular reference to the formation of metastases. Those penetrating cortical arterioles and capillaries running vertically down through the cortex to the medulla are most likely to afford embolic sites for growth, and it is surprising therefore to find that the majority of these deposits are situated first in the medulla. There can be no doubt that the arterioles and the capillaries of the cortex are unusually wide and that growth emboli may for this reason make their way successfully to the medulla. Emboli have been observed in otherwise normal glands by Adams (1923) and by Robson (1928), and arterial embolism is undoubtedly the route by which these growths take origin. They may occur primarily in the cortex, or primarily in the medulla, or in both together (see R.C.S. museum, Spec. No. 2112–3, from penis). On rarer occasions growth may also infiltrate direct from contiguous structures or through the lymphatics (see R.C.S. museum, Spec. No. 2054–1, lymphosarcoma).

Dosquet (1921) has suggested that the high frequency of adrenal metastases and cerebral metastases in lung cancer illustrates tissue susceptibility to growth deposit, both ectodermal nervous tissues being embedded in a material rich in lipoids.

Pathological Physiology

No description of the morbid anatomy of the changes in the adrenal glands in relation to sudden death would be complete without a proper analysis of the exact sequence of events that leads to death.

A close parallel exists between the symptoms and signs consequent upon experimental extirpation of the gland and those following deprivation from natural causes.

Under experimental conditions, in dogs (Banting and Gairns 1926) surviving less than 50 hours, for instance, the most striking changes are as follows (Fig. 6).

(*a*) An initial period of surgical shock (absent under natural conditions):
Weakness.
Loss of appetite.
Vomiting.
Convulsions, and
Respiratory paralysis; and these are accompanied by:

(*b*) Oliguria or complete anuria, reduced temperature, oxygen consumption, and body-weight. The basal metabolic rate falls by as much as 25 per cent. Changes in the blood chemistry.

The onset of these changes is insidious, the subject becoming apathetic and slow, weak in the hind legs, then lying prostrate, refusing food and often vomiting. Muscular twitchings and then frank convulsions develop, respirations becoming slow and laboured, and eventually ceasing, though the pulse may still continue.

In the case of bilateral hæmorrhagic necrosis already described these features developed with remarkable faithfulness. This infant of 10 months in turn showed loss of appetite and apathy, lay prostrate and then vomited, developed fits, went into coma, breathing "with great clutching breaths," then dying in its mother's arms quite unexpectedly.

Adverse conditions may precipitate these changes, as for instance in the case of acute caseous tuberculosis

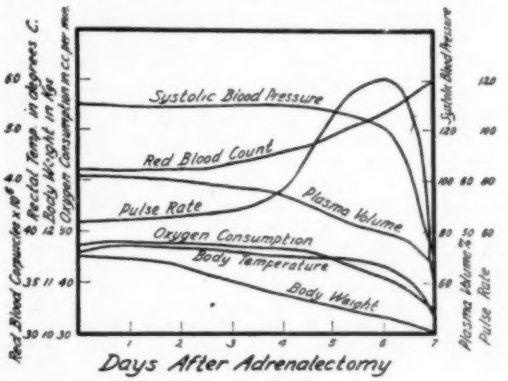


FIG. 6.—The physiological changes after adrenalectomy in dogs.

described in which death was precipitated by unusually vigorous exercise—playing football. In older persons exertions may be quite mild, as with the case of growth infiltration in a man who was doing no more than bending to pick up stones from a furrow and cast them aside. Extremes of temperature may cause failure in the same way. The mechanism of this will be discussed below in connexion with the changes in blood chemistry.

BLOOD CHEMISTRY

It is in the examination of changes in the chemistry of the blood that the causes of death become apparent

(Fig. 7). They are related principally to alterations in hepatic and renal function consequent upon deprivation of the essential cortical hormone. Those changes consequent upon diminution of hepatic function are reflected in a rise in the cholesterol and a fall in blood-sugar; this latter may be so pronounced as to reach convulsive levels (Porges 1910), and at the same time there occurs a remarkable diminution of both liver and muscle glycogen, restoration failing

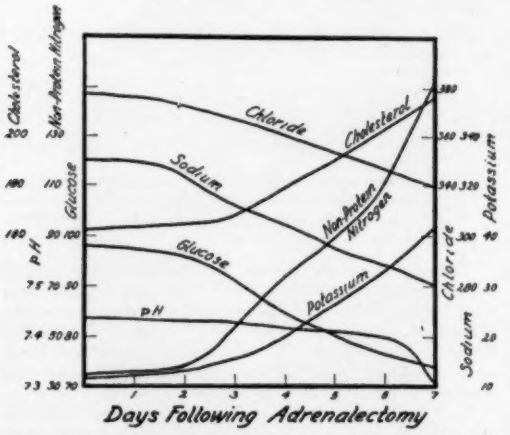


FIG. 7.—Changes in the blood chemistry after adrenalectomy.

to take place after exercise. It is clear that the cortical hormone is essential either for the normal synthesis of glycogen by muscle, or for the maintenance of the normal balance between blood-sugar and tissue glycogen.

Diminution of kidney function, related clearly to dysfunction of both glomerular and tubular elements, is reflected in a sharp rise in blood-urea and other non-proteinous nitrogen constituents of the blood, the urinary output being decreased.

The blood volume is reduced, together with the levels of both sodium and chloride, the urinary output of these substances vastly exceeding the intake over any period after the second day (Loeb 1923).

There is no deviation of fluid into the tissues, which indeed become dehydrated, and no passage of fluid into the red corpuscles, these becoming increased in number as the blood concentrates.

Sodium diminishes by as much as 15 per cent.; on the other hand potassium values increase by as much as 42 per cent. and magnesium by as much as 23 per cent., effectively maintaining the falling osmotic pressure (Baumann and Kurland 1923). There can be no doubt that this imbalance of kations alone provides reasonable cause for the variations in muscle tone and movement observed.

In Fig. 6 it will be noticed that the chloride loss is relatively less than that of sodium. This results, of course, in a decrease in bicarbonate and a disturbance in the acid-base equilibrium, the *p*H falling.

Now other acute pathological conditions, like diabetic acidosis and high intestinal obstruction, are also attended by much the same loss of inorganic base. They too are remarkable for their resemblance to the conditions of shock, just as is acute cortical insufficiency, and they too can be relieved by the restoration of sodium chloride. Immediate relief follows adjustment of the electrolyte balance (Soddu 1898). It must of course be remarked that the condition is distinct from that of "surgical shock": it is rather an intolerance to the various influences that may cause shock. In some respects the conditions are analogous to those of hypocalcæmia after deprivation of parathyroid, and in this respect it would not be unreasonable to attribute to the adrenal cortex the control of sodium.

Conclusion

Although the loss of sodium and its attendant imbalance of electrolytes are the most striking of the processes developing in acute adrenal insufficiency, the clinical features are not adequately explained by this succession of changes alone. It is clear that both hypoglycæmia and dehydration have their parts to play; their importance in the mechanism of death cannot be ignored.

Each of these three biochemical anomalies developed in relation to cortical insufficiency has its experimental champion, Loeb supporting the changes in sodium metabolism, Britton emphasising the undeniable importance of hypoglycæmia, and Swingle and Pfiffner investing the loss of tissue fluid and plasma volume with chief responsibility. Each has claims which are irrefutable, and it is abundantly clear that all three collectively, rather than one individually, are to be held responsible for death.

I wish to express my gratitude to Dr. A. D. Cowburn, Dr. P. B. Skeels, and Dr. L. F. Beccle, coroners respectively for South London, Metropolitan Essex, and South Essex, to whom I am indebted for certain of the specimens shown.

REFERENCES

Adams, F. D. (1921) *Arch. intern. Med.* **27**, 175.
Banting, F. G., and Gairns, S. (1926) *Amer. J. Physiol.* **77**, 100.
Baumann, E. J., and Kurland, S. (1923) *J. biol. Chem.* **55**, 457.
Biedl, A. (1910) *Janus*, **15**, 193.
Bornstein, A., and Gremels, H. (1925) *Arch. path. Anat.* **254**, 409.
Crowe, S. J., and Wislocki, G. B. (1914) *Bull. Johns Hopk. Hosp.* **25**, 287.
Dosquet (1921) *Virchows Arch.* **234**, 481.
Elsässer, quoted by Mackenzie, J. J. (1922) Endocrinology and Metabolism, vol. ii, p. 257.
Guttman, P. H. (1930) *Arch. Path.* **10**, 742, 859.
Krause, E. J. (1927) *Beitr. path. Anat.* **78**, 283.
Landau, M. (1912) *Frankfurt. Z. Path.* **11**, 26.
Langlois, P. (1898) *Arch. de Physiol.* **10**, 124.
Levinson, S. A. (1935) *Amer. J. Surg.* **29**, 94.
Loeb, R. F., Atchley, D. W., Benedict, E. M., and Leland, J. (1933) *J. exp. Med.* **57**, 725.
MacKay, E. M., MacKay, L. L., and Addis, J. (1932) *Ibid*, **56**, 255.
Pende, N. (1923) *N.Y. med. J.* **118**, 469.
Porges, O. (1910) *Z. klin. Med.* **69**, 341.
Robson, G. M. (1928) *Arch. Path.* **5**, 751.
Scheidegger, S. (1933) *Zbl. allg. Path. path. Anat.* **57**, 163.
Soddu, L. (1898) *Sperimentale*, **1**, 87.
Stewart, G. N., and Rogoff, J. M. (1929) *Amer. J. Physiol.* **91**, 254.
Willis, R. A. (1934) The Spread of Tumours in the Human Body, London, pp. 277–80.

ROYAL LONDON OPHTHALMIC HOSPITAL.—The first full year's workings at the enlarged Moorfields Hospital show that annual expenditure was nearly £50,000—an increase of over £5500. More cases were treated than ever before, a total of 66,877 being reached. Building operations have cost £181,000 and supporters are being appealed to for special donations to pay off the debt.

ROYAL WEST SUSSEX HOSPITAL, CHICHESTER.—The Bishop of Chichester presided on March 24th at the annual meeting of the governors of this hospital. The financial report showed an excess of expenditure over income of £211, but the figure would have been larger but for a legacy of £2000. Subscriptions amounted only to £1495, which was less than 10 per cent. of the expenditure. It was stated that an economy committee set up last year had decided that the institution was economically administered and that it would not be justifiable to close down a number of beds, considering the small sum involved. The West Sussex Associated Hospitals Contributory Fund had contributed £4453 to the hospital.

DIPHTHERITIC MYOCARDITIS

AN ELECTROCARDIOGRAPHIC STUDY

BY NORMAN D. BEGG, M.D. Aberd., D.P.H.

MEDICAL SUPERINTENDENT TO THE BOROUGH INFECTIOUS HOSPITALS, SOUTHEND-ON-SEA

COINCIDENT with the decline in laryngeal involvement practically all the serious manifestations of diphtheria have come to be associated with the so-called faucial forms of the disease. Here the diphtheria bacillus, remaining in situ, produces a variable amount of soluble exotoxin which has a primary affinity for heart muscle and nerve tissue. Death in diphtheria results much more commonly from cardiovascular involvement than from purely paralytic phenomena, and it is towards the heart complications of diphtheria that attention will be directed in this paper.

The electrocardiographic approach to this problem is not a new one. American, and continental writers in particular, having described the gross conductive lesions of diphtheria and correlated them with degenerative changes in the bundle of His revealed post mortem, passed on to study the steps in the development of minor disorders of cardiac function which had not previously been recognised. In this way serial electrocardiograms have come to occupy a position of some importance in prognosis although almost every investigator admits that occasionally they fail to explain the whole mechanism of circulatory collapse in diphtheria. Nor, in the face of certain fundamental facts, is it reasonable to expect them to do so. An electrocardiogram is merely a record of the changing electrical activity within heart muscle and affords no direct evidence of structural damage—although this latter may be inferred in many cases with a considerable degree of accuracy. Moreover an electrocardiogram cannot reveal changes occurring outside the heart muscle. Thus in cardiovascular failure which is primarily peripheral in origin a normal electrocardiogram may be expected even when death is imminent. But peripheral failure by itself is a rare event in diphtheria—in the vast majority of cases the cardiac mechanism is equally involved. Hence the importance of obtaining precise information on the state of at least part of the cardiovascular system need not be emphasised.

Scope of the Investigation

The present series comprised 100 cases of severe faucial diphtheria which were subjected to electrocardiographic investigation. In order to avoid moving severely ill cases, four of the diphtheria wards were wired to the electrocardiographic department. A standard Cambridge instrument was used throughout and records were obtained by the falling-plate method. The first electrocardiogram was taken immediately after admission; thereafter records were obtained daily or at intervals of a few days during the first three weeks and subsequently at longer intervals until convalescence was established. It was hoped from such an investigation to obtain information on the following points: (1) the frequency of various heart changes in diphtheria as revealed by electrocardiography; (2) the prognostic significance of these changes; and (3) the persistence or otherwise of diphtheritic heart lesions.

Before proceeding to study these cases in detail certain generalisations may be permissible. In the first place direct involvement of part or whole of the cardiovascular system occurs almost invariably within the first three weeks of an attack of diphtheria, although, of course, lesions appearing in this stage may persist for many weeks. Secondly, circulatory failure in diphtheria appears in two forms. These were distinguished by Schwentker and Noel (1929) on a purely pathological basis into an early and a late type.

Early circulatory failure appears within the first few days of disease and represents the sum of toxic effects on all organs. The principal clinical manifestations are a fall in blood pressure, a small rapid pulse, extreme pallor, cyanosis and coldness of the extremities—a physical state more commonly associated with conditions of shock than cardiac failure. Carbohydrate metabolism is invariably deranged and there is an abnormal body response to the intravenous injection of dextrose in the direction of higher blood-sugar findings. Electrocardiographic evidence of myocarditis may or may not be present but is rarely so pronounced as to indicate impending death—an event which frequently does ensue.

Late circulatory failure appears usually between the third and fourteenth day of the disease. Evidence of peripheral failure may be present but the outstanding feature is clinical and electrocardiographic evidence of damage to heart muscle or to the specialised tissue of the conducting system. Death is also a common event in late circulatory failure but almost any degree of myocardial damage may be recoverable in individual cases and, on the whole, the outlook is relatively better than in early circulatory failure.

Results

The average day of death in this series from circulatory failure early or late was the tenth day of disease and the latest day recorded was the nineteenth day of disease. Two deaths from broncho-pneumonia and diaphragmatic paralysis were excluded. A further study of fatal cases reveals the fact that in 3 cases only could the associated circulatory failure be described as the early type, and two of these showed some electrocardiographic evidence of myocarditis. In contrast, deaths typical of late circulatory failure numbered 23 and in each case there was electrocardiographic evidence of myocardial involvement with or without the addition of a frank conductive lesion.

It is possible to divide the 100 subjects of this investigation into three groups consisting of (*a*) those showing no significant abnormality, (*b*) those showing evidence of myocarditis without a gross conductive lesion, and (*c*) those showing an associated conductive lesion. The results of such a classification are summarised in the Table.

It will be seen that 84 per cent. of cases developed some electrocardiographic abnormality as a result of diphtheria, and that in no less than 27 per cent. of all cases this abnormality took the form of a conductive lesion, the mortality in the latter group being more than twice that of the group showing no predilection for the conducting system.

A description of the chief abnormalities revealed in the three groups is given below, and the significance of each is discussed. It is necessary to emphasise the fact that lesions merge into each other and that combinations of two or more lesions are by no means uncommon. Hence the classification used is only one of convenience, in an attempt to study the salient abnormality of individual cases.

TABLE SHOWING CASE-FATALITY IN VARIOUS GROUPS DETERMINED BY ELECTROCARDIOGRAPHIC CHANGES

—	No significant abnormality.	Myocarditis.							Total.
		No demonstrable conductive lesion.				Demonstrable conductive lesion.			
		Slurred Q R S.	Low voltage.	Changes in T.	Paroxysmal tachycardia.	Complete heart-block.	Bundle-branch block.	Intra-ventricular block.	
Cases	16	8	6	35	8	12	6	9	100
Deaths	1	1	0	4	8	8	4	2	28
Case-fatality per cent.	6·2	12·5	0	11·4	100·0	66·7	66·7	22·2	28·0
Total mortality per cent. ..	6·2	22·8				51·9			28·0

APPARENTLY NORMAL GROUP

As a normal electrocardiogram varies within tolerably wide limits, no significance has been attached to inversion of the T wave in lead III, or to a low, notched Q R S complex in lead III. When the tracing is otherwise normal these variations appear constantly in successive records and remain uninfluenced by the disease. Alstead (1932) does not regard evidence of electrical axis deviation of the heart as significant. In his experience this change, unless it appeared in serial records during the course of the disease, was not associated with an abnormal heart clinically. I am in complete agreement with this observation and 5 such cases are included here. The remainder, showing physiological electrocardiograms throughout, included one in which death occurred from early circulatory failure. Electrocardiograms taken from this case on the fourth, seventh, and ninth day revealed no abnormality and clinical examination of the heart failed equally to anticipate the sudden circulatory collapse that took place on the tenth day of the disease.

MYOCARDITIS GROUP

The abnormalities in this group are associated with the ventricular portion of the tracing. Evidence of a minor prolongation of conduction time may also be present but the main characteristic is not a gross lesion of the conductive system.

Q R S complex.—This represents the first stage of ventricular activity. Each deflection of a normal Q R S complex is recorded as two uninterrupted evenly shaded straight lines, which converge to a sharp point. Pronounced shading at any point is abnormal and results in a slurred Q R S. In diphtheria slurring takes place on the down stroke of the R wave and in extreme cases results in a deep curved S wave (Fig. 1 A)—a direct precursor of T wave changes. By itself it indicates a moderate degree of myocarditis which is unlikely to cause death in the absence of peripheral failure. However, of 8 cases exhibiting this abnormality, 1 died of early circulatory failure on the seventh day of disease.

T wave changes.—The T wave is the final evidence of ventricular activity. Normally it is upright and has an amplitude which should not be less than 0·15 millivolt. In diphtheritic myocarditis the T wave may be depressed, diphasic, iso-electric, or inverted. A typical example is shown in Fig. 1 B. T wave changes of any degree commonly indicate more severe myocarditis. In diphtheria, however, the outlook is reasonably good, since of 35 cases showing this abnormality only 4 died, death in 1 case being primarily due to broncho-pneumonia.

Low voltage.—Normally the R wave amplitude does not fall below 0·6 millivolt except in lead III or less commonly in lead I. Considerably lower voltages in all three leads of an electrocardiogram were occasionally recorded in this series. By itself this does not appear to have serious prognostic significance, but when T wave changes are associated with low amplitudes (Fig. 1 C) severe myocarditis may be assumed.

Disturbances of the pacemaker.—The heart beat normally originates in the sinus node. Occasionally through nervous or other disturbances the pacemaker may not function properly and the beat may originate in other parts of the heart. For example, where the source of heart rhythm is abnormally situated somewhere in the auriculo-ventricular nodal tissue a record such as shown in Fig. 2 is obtained. Extrasystoles on the other hand arise independently of the existing heart rhythm and always from a focus outside the

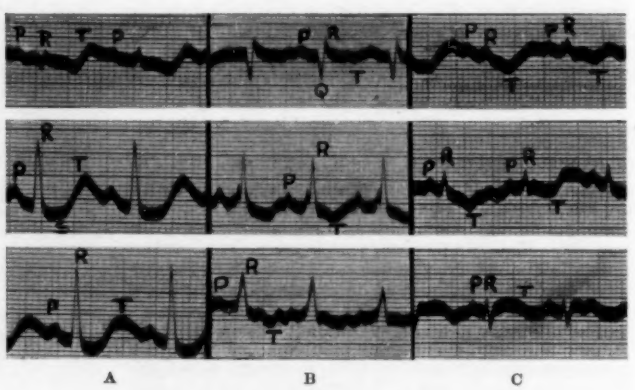


FIG. 1.—DEGREES OF MYOCARDITIS

A.—Slurring of the R wave and deep curved S in leads II and III and a biphasic T wave in lead I. Moderate myocarditis.

B.—The ascending limb of the R wave in lead II is splintered; there is slight intraventricular delay; the T wave is inverted in each lead. More severe myocarditis.

C.—The maximum voltage of the R wave in any lead is 0·5 millivolt. The T wave is inverted in leads I and II. Severe myocardial damage.

sino-auricular node. In diphtheria they are usually ventricular in origin and, in common with disturbances of the pacemaker, do not appear to indicate a myocarditis of any degree, if the record is otherwise normal.

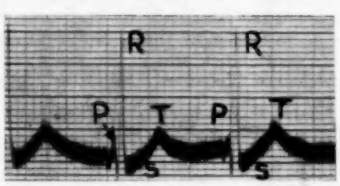


FIG. 2.—The P wave is occasionally buried in or can be seen jutting out from the Q R S complex. Nodal rhythm.

Tachycardias not of sinus origin are paroxysmal in character and represent a rapid and regular succession of premature contractions which may arise in an ectopic focus in the auricle, auriculo-ventricular junctional tissues, or ventricle. In the present series one example of paroxysmal auricular tachycardia (Fig. 3 A) ending fatally was observed. Paroxysmal tachycardia of ventricular origin (Fig. 3 B) was seen on 7 occasions and it is significant to note that each patient died within a few days of the appearance of this abnormality.

Ventricular fibrillation is probably a fairly frequent terminal event in a dying heart muscle, although Josephthal (1934) records a case of post-diphtheritic ventricular fibrillation which recovered. Attempts to obtain terminal pictures in this series were uniformly unsuccessful. This must be attributed to the time lost in manipulation of plates during an exposure; it is a method of obtaining records that is ideal for ordinary purposes but possesses great disadvantages when a continuous record is desired. An electrocardiogram taken within half an hour of death is shown in Fig. 7.

Coronary thrombosis.—In spite of suggestive clinical findings, such as severe precordial pain and sudden diminution in heart sounds, the RS–T segment changes characteristic of coronary thrombosis were never seen in this series. Other gross lesions may obscure the electrocardiographic picture in individual cases, but Warthin (1924) was able to demonstrate only one small thrombosis in 16 diphtheria autopsies, and it seems probable that coronary thrombosis is not a common event in diphtheria.

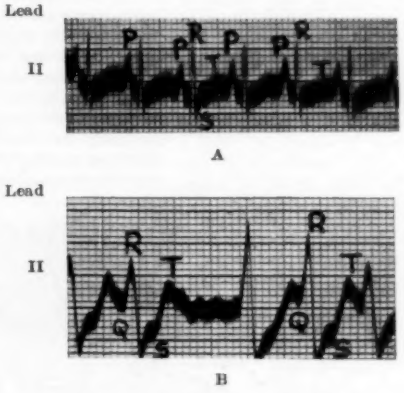


FIG. 3.—PAROXYSMAL TACHYCARDIA

A.—The rate is rapid (180); the rhythm is regular; the distinct peaked P waves identify the auricular source of the tachycardia. Paroxysmal auricular tachycardia.

B.—The rate is rapid (175); the rhythm is irregular; the P waves are buried in distorted ventricular complexes. Paroxysmal ventricular tachycardia.

CONDUCTIVE LESIONS

Complete heart-block.—Auriculo-ventricular block may occur in three stages. The earliest manifestation is a delay in auriculo-ventricular conduction time resulting in a prolongation of the P–R interval in the electrocardiogram. A further delay will lead to dropped beats at regular or irregular intervals. If conduction is still further disturbed there occurs a complete dissociation between auricles and ventricles which respectively adopt independent rhythms (Fig. 4 A). A characteristic of diphtheritic lesions of the main bundle of His is that complete auriculo-ventricular dissociation appears usually without preliminary changes in the P–R interval. In this respect they differ considerably from complete heart-block arising from causes other than diphtheria. Marvin (1925) however, unlike other observers, did record a significant P–R delay before the onset of complete heart-block. Preliminary prolongation of the P–R interval was not seen in this series, the usual sequence being some abnormality in the ventricular portion of the tracing and then, suddenly, complete dissociation. Diphtheritic dissociation differs from other forms of complete heart-block in two other respects. In the first place it may be very transient; complete heart-block in one case in this series lasted only 24 hours. Secondly, it is not invariably associated with a slow ventricular rate. This is of some importance since complete heart-block asso-

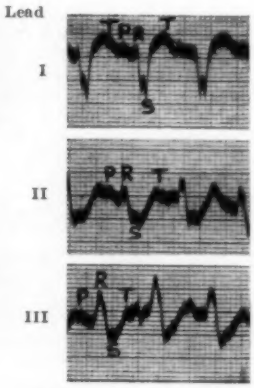


FIG. 5.—The wide notched Q R S complexes are directed upwards in lead III and dowards in lead I. The T wave in lead I is opposite in sign to the main initial deflection but in lead III it is in the same direction. Atypical right bundle-branch block.

FIG. 4.—COMPLETE HEART-BLOCK

A.—The ventricular rate is slow (32); the auricular rate is 85; there is complete auriculo-ventricular dissociation; a ventricular extrasystole recurs regularly after each ventricular beat. Complete heart-block with coupled beats.

B.—The ventricular rate is fast (135); the auricular rate is 100; the auricle and ventricle are beating independently and regularly. Complete heart-block with fast ventricle.

ciated with a fast ventricular rate (Fig. 4 B) may be impossible to detect on ordinary clinical examination. The outlook in the presence of complete heart-block has invariably been stated to be grave. In this series it was no worse than in the presence of bundle-branch

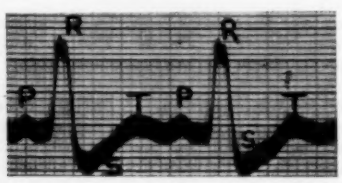


FIG. 6.—The Q R S complex is wide (0·12 sec.), notched and directed upwards in each lead; the T wave is upright. Intraventricular block.

block; a third of the cases in both categories recovered.

Bundle-branch block.—Conduction of the wave of excitation may be partially or completely blocked in its passage through either the right or the left branch of the bundle of His. Typically the electrocardiographic evidences of complete block of a branch of the bundle of His consist of a wide notched R wave and a T wave opposite in sign to the main initial deflection. Less commonly the T wave in lead I or lead III may fall in the same directions as the Q R S complex (Fig. 5). In this series 6 cases showed bundle-branch block, the right branch of the bundle being involved only in one instance.

Intraventricular block.—Oppenheimer and Rothschild (1917) in pointing out the seriousness of bundle-branch lesions in diphtheria included in their description a partial interference with one of the main bundle branches. There is some doubt whether electrocardiograms showing incomplete block do represent interference with conduction in the fine ramifications of the Purkinjé network or in the ventricular muscle. Characteristically the electrocardiogram reveals a slurred or notched Q R S widened beyond the normal limit of 0·1 sec. and a T wave which may be upright, depressed, or inverted (Fig. 6). Of all conductive lesions in diphtheria intraventricular block appears to be the least serious. Only 2 cases showing this lesion died, and in 1 of these the case made a complete electrocardiographic and clinical recovery from the heart lesion, but succumbed later to diaphragmatic paralysis.

RECORDS IN CONVALESCENCE

Contrary to expectation electrocardiography does not yield much evidence of persistent heart damage after diphtheria. Undoubted examples of permanent lesions have been recorded but, unless one believes with Butler and Levine (1930) that diphtheria predisposes a heart to earlier sclerosis than would normally have taken place, the striking feature of the severe myocardial lesions in diphtheria is that recovery in non-fatal cases should apparently be so complete. Probably the true incidence of permanent lesions after diphtheria will not be assessed until a representative group of children are investigated periodically throughout an attack and for several years to follow. In this respect the observations recorded here are open to the same objection in that they represent only part of a picture. However, serial electrocardiograms of 57 cases who had developed definite heart lesions in the course of diphtheria were continued until convalescence was established. On two occasions only was any evidence of significant electrocardiographic abnormality obtained. This consisted in one case of a minor degree of widening of the Q R S complex following complete heart-block and in the other case low heart voltages were recorded following bundle-branch block.

Summary

1. Investigation of a series of 100 cases of severe diphtheria shows that the great majority develop cardiac abnormalities within the first three weeks of the disease. In many cases the exact nature of the abnormality cannot be recognised except by the auxiliary evidence of an electrocardiogram.

2. If complete heart-block, bundle-branch block, or paroxysmal tachycardia appear in electrocardiograms during the course of diphtheria, the outlook as regards recovery is relatively bad.

3. In the presence of other evidence of myocardial involvement, including intraventricular block, the prognosis is reasonably favourable.

4. A normal electrocardiogram, particularly within the first few days of the disease, does not preclude the possibility of a sudden circulatory collapse and, in this respect, clinical examination may be equally misleading. Probably at this stage of the disease an intravenous sugar-tolerance curve remains the most sensitive guide to prognosis.

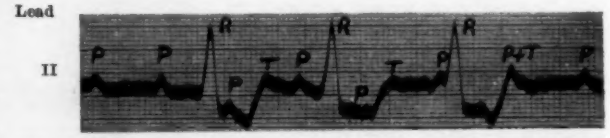


FIG. 7.—There is complete auriculo-ventricular dissociation; the ventricular complex recurs irregularly and consists of a large irregular R wave followed by an abnormal S–T phase. Complete heart-block; dying myocardium.

5. Except in a small proportion of conductive lesions, recovery after diphtheritic myocarditis appears to be complete as judged by electrocardiograms taken in convalescence.

I wish to acknowledge my indebtedness to Dr. E. H. R. Harries for the facilities afforded me in obtaining access to these records since I left the North Eastern Hospital, and for his permission to publish this paper.

BIBLIOGRAPHY

Alstead, S. (1932) *Quart. J. Med.* **1**, 277.
— (1933) *Lancet*, **1**, 413.
Begg, N. D. (1935) *Ibid*, **1**, 480.
Butler, S., and Levine, S. A. (1930) *Amer. Heart J.* **5**, 592.
Chamberlain, E. N., and Alstead, S. (1931) *Lancet*, **1**, 970.
Hoskin, J. (1926) *Ibid*, **1**, 1141.
Hoyrne, A., and Welford, N. T. (1934) *J. Pediat.* **5**, 642.
Jones, T. D., and White, P. O. (1927) *Amer. Heart J.* **3**, 190.
Josephthal, F. (1934) *Wien. Arch. inn. Med.* **26**, 15.
Kiss, P. V. (1931) *Arch. Kinderheilk.* **94**, 97.
Marvin, H. M. (1925) *Amer. J. Dis. Child.* **29**, 433.
Nathanson, M. H. (1928) *Arch. intern. Med.* **42**, 23.
Oppenheimer, B. S., and Rothschild, M. A. (1917) *J. Amer. med. Ass.* **69**, 429.
Place, E. H. (1932) *New Engl. J. Med.* **207**, 864.
Reid, W. D. (1930) *Amer. Heart J.* **5**, 524.
Schuppler, H. (1935) *Jahrb. f. Kinderheilk.* **98**, 135.
Schwentker, F. F., and Noel, W. W. (1929) *Bull. Johns Hopk. Hosp.* **45**, 276.
Stecher, R. M. (1928) *Amer. Heart J.* **4**, 545, 715.
Warthin, A. S. (1924) *J. infect. Dis.* **35**, 32.

VICTORIA COTTAGE HOSPITAL, BARNET.—The Princess Royal on March 16th reopened this hospital which has been closed since last summer for extensions. The extensions cost £21,000.

THE ACTION OF CORPUS LUTEUM HORMONE ON THE HUMAN MENSTRUAL CYCLE

BY THOMAS N. MORGAN, M.D. Aberd.

LECTURER IN THE DEPARTMENT OF MATERIA MEDICA, UNIVERSITY OF ABERDEEN; VISITING PHYSICIAN TO THE WOODEND HOSPITAL; AND CLINICAL TUTOR AT THE ABERDEEN ROYAL INFIRMARY; AND

SYDNEY G. DAVIDSON, F.R.C.S. Eng.

ASSISTANT IN THE DEPARTMENT OF SURGERY, UNIVERSITY OF ABERDEEN; VISITING SURGEON TO THE WOODEND HOSPITAL; AND ASSISTANT SURGEON TO THE ABERDEEN ROYAL INFIRMARY

THE physiology of the menstrual cycle has in recent years been considerably clarified by the isolation of the ovarian hormones and the demonstration of their pharmacological actions. The present state of knowledge has however been reached mainly as a result of animal experiment. It is clear that the rational use of these hormones in therapeutics will only be possible when the part which they play in the human menstrual cycle is fully understood, and the important details of optimum dosage and time of administration have been obtained by experiment in the human subject. The experiments to be described in this communication were carried out on normal women with the object of obtaining more complete information regarding the function of the corpus luteum, and to determine the dose of corpus luteum hormone required to produce an effect similar to that produced by the corpus luteum itself.

It is now well recognised that treatment of castrated animals with œstrone prevents the development of the regressive changes in the genital tissues consequent upon castration. E. Allen (1932) has shown that the injection of œstrone into castrated monkeys (*Macacus rhesus*) will so far simulate the action of endogenous hormone as to produce not only growth of the uterine endometrium comparable to that seen in the normal animal about the middle of the menstrual cycle, but also reddening of the sexual skin, a phenomenon which occurs normally in *Macacus rhesus* in the mid-menstruum. Zuckerman and Morse (1935) have been able to produce in primates a cystic condition of the endometrium similar to that which may occur in woman and which is associated with over-production of œstrone (metropathia hæmorrhagica). This condition has also been produced in the human subject by prolonged treatment with œstrone (Kaufmann 1934).

CONTROL OF THE ENDOMETRIUM

So far as the early part of the menstrual cycle is concerned, therefore, the growth of the uterine endometrium would appear to be under the control of the ovarian œstrone. With regard to the latter part of the cycle, it has for long been thought that the change in structure which the endometrium undergoes after ovulation is due to the influence of the corpus luteum. This conjecture is supported by the finding of Corner and Allen (1929) that the injection of an active extract of corpus luteum into the œstrus rabbit alters the structure of the endometrium from the œstrus state to that typical of pseudo-pregnancy. It was subsequently shown by W. M. Allen (1930) that the hormone of the corpus luteum could only produce such a change if the endometrium was first acted upon by œstrone. Later Hisaw, Meyer, and Fevold (1930), and Smith and Engle (1932) demonstrated the fact that the typical pre-menstrual endometrium could be produced in castrated rhesus monkeys by treatment with œstrone followed by corpus luteum hormone. The final integration of these findings and their application to the human menstrual cycle was performed by Kaufmann (1934) who succeeded in reproducing a complete menstrual cycle associated with the typical changes in the endometrium in castrated women, by injecting 250,000 mouse units of œstrone every fourth day for 15 days and following this with 21 clinical units of corpus luteum hormone daily for five days. Cessation of the injections was followed by true menstrual bleeding.

It has thus been established that the cyclical endometrial changes which precede menstruation are under endocrine control, but the cause of the phenomenon of menstruation itself remains obscure. That the hormone of the corpus luteum is not necessary for menstruation is suggested by the observation that in both monkeys (E. Allen 1927) and women (Corner 1933), hæmorrhage can occur regularly from the uterus in the absence of ovulation, and therefore in the absence of a corpus luteum. Further it has been shown by E. Allen (1927) that, after endometrial growth has been induced in monkeys by œstrin, the subsequent cessation or diminution of the dose is followed by uterine bleeding. A similar finding has been made in the case of women by Werner and Collier (1933). The view thus gained support that normal menstruation occurs as a result of the sudden deprivation of œstrin. This hypothesis is however apparently confounded by the experiments of Engle et al. (1935) who showed that bleeding following the cessation of œstrin injections can be prevented by the administration of corpus luteum hormone and that stopping the corpus luteum treatment is followed by bleeding within 4 to 6 days. We have thus at least two possible explanations of the cause of menstrual hæmorrhage: (1) that the hæmorrhage occurs when the level of blood œstrone falls below that necessary to maintain the endometrium; and (2) that the hæmorrhage and desquamation of the endometrium result from the loss of corpus luteum hormone consequent upon degeneration of the corpus luteum.

If the former hypothesis is correct it should be possible to postpone the onset of menstruation in women by the continuous administration of œstrone. This has been tested by Zuckerman (1936) and others, who find that the administration of œstrone in daily doses of 250–1000 rat units fails to prevent the onset of menstruation unless the injections are begun before the time of ovulation. This finding is explained not by a direct action of the œstrone on the endometrium but by its action in inhibiting the production of gonadotropic hormone by the hypophysis, so that in the case where œstrone is administered early in the cycle, ovulation fails to occur and no corpus luteum is formed. The endometrium thus remains under the unopposed influence of the exogenous œstrone, and bleeding is delayed so long as the administration is continued. If however injections are begun after a corpus luteum is formed, menstruation occurs at the expected time in spite of the continuous administration of œstrone. This interpretation of Zuckerman's results is supported by the observation of Hisaw (1935) that in monkeys the administration of œstrone will prevent the onset of bleeding after ovariectomy, only if the operation is performed during the early part of the cycle before an active corpus luteum is present in the ovary.

As already indicated, our experiments were carried out to test the second of these theories, by

determining first if it is possible to delay the onset of menstruation by the continuous administration of corpus luteum hormone during the latter part of the menstrual cycle, and secondly if, and in what dose, a corpus luteum hormone would replace the function of the normal corpus luteum. The hormone used was Proluton (Schering-Kahlbaum). The active principle in this preparation is a synthetic derivative of stigmasterol and has the same formula as that described for the natural hormone of the corpus luteum by Butenandt and Schmidt (1934); 5 mg. has a potency of 20 clinical units. The preparation was tested by us to prove its activity in altering the structure of the rabbit endometrium, and in diminishing the motor activity of the uterus, and was found to possess both these properties.

It was necessary to perform a number of control observations, and accordingly the experiments will be described in three parts:—

(*a*) Observations on the effect of excision of the recent corpus luteum on the menstrual rhythm.
(*b*) Observations on the effect of administering corpus luteum hormone in the latter part of the menstrual cycle.
(*c*) Observations on the effect of substituting exogenous hormone after surgical removal of the corpus luteum.

EFFECT OF SURGICAL REMOVAL OF THE CORPUS LUTEUM

For this part of the investigation female patients requiring operation for chronic appendicitis were utilised, and only those in whom there was no evidence of any gynæcological disorder, and who could provide an accurate menstrual history, were included in the series.

Where possible the patient was observed in the ward during one menstruation and the operation was performed at a selected time in the succeeding intermenstruum. In this way ten cases were operated upon after the 15th day of the cycle counting from the first day of the previous menstruation; and at the operation the ovaries were inspected and the recent corpus luteum excised. In each

CHART 1.—*Laparotomy with Excision of Corpus Luteum*

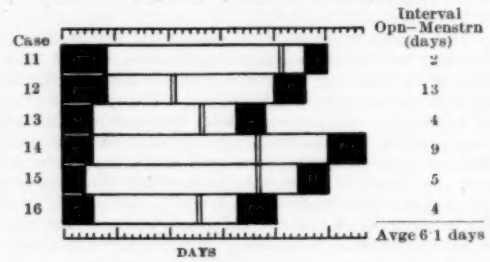
case it was examined histologically to corroborate its age. It was observed that in cases operated on near the middle of the menstrual cycle the corpus luteum was fresh and incompletely formed, whereas in two cases operated upon late in the cycle the histological appearance of the gland indicated that ovulation had occurred much later than the 15th day of the cycle. On the other hand it was never found that a case operated on shortly after the 15th day showed a degenerating gland.

The time of onset of uterine bleeding, carefully noted in each case, was never longer than 48 hours after the operation, the average time of onset throughout the series being 32 hours (Fig. 1).

According to Pratt (quoted by Bartelmez 1937) the effect of surgical removal of the corpus luteum in precipitating the onset of menstruation is not specific, and any manual manipulation of the ovary may induce premature menstruation. To determine therefore if the operation per se, or the manipulation necessary in excising the corpus luteum without actual removal of the gland, would be sufficient to precipitate menstruation, two additional sets of observations were made.

CONTROL GROUP 1.—Cases selected upon the criteria already described were submitted to operation in the latter

CHART 2.—*Laparotomy without Handling Ovaries*



part of the intermenstruum, and in these the pelvic viscera were not disturbed, the ovaries being as far as practicable inspected to ascertain the presence of a corpus luteum without handling them in any way. In 4 cases of this group the onset of menstruation was not accelerated and occurred at or about the expected date. In 2 cases menstruation appeared earlier than the expected time, but in no case did menstruation occur as soon after operation as in the previous group (Fig. 2).

The average interval between operation and menstruation was 6·1 days.

CONTROL GROUP 2.—A third group of 7 cases were examined in the same way, but in these the ovaries were delivered at the wound and handled, though the corpus luteum was not removed. In 4 cases the onset of post-operative menstruation was not hastened. In Cases 19, 21, and 22 (Fig. 3) an interval of 5, 3, and 6 days respectively elapsed between the operation and the appearance of uterine bleeding. It is interesting to note that in Cases 18, 19, and 23 small cysts were excised from the ovaries.

Even when, therefore, the traumatisation of the ovary was as great as in the cases in which the corpus luteum was removed, the occurrence of post-operative menstruation was delayed for 5, 5, and 14 days.

THE ACTION OF CORPUS LUTEUM HORMONE ON NORMAL MENSTRUATION

The experiments just described have shown that excision of the corpus luteum precipitates the onset of menstruation. To test the theory that normal menstruation is brought about by loss of the corpus luteum, an attempt was next made to delay the onset of bleeding in normally menstruating women by the intramuscular injection of proluton. The investigation was carried out on patients submitted to prolonged hospitalisation on account of chronic pulmonary tuberculosis.

Patients presenting a history of regular menstruation were selected, and the interval between successive menstruations was determined over 3 or 4 months in each case. Shortly before the onset of the expected menstruation, intramuscular injections of proluton were begun and continued daily until menstruation started. Since it was impossible in most cases to foretell with any degree of certainty the day of onset of menstruation, the cases

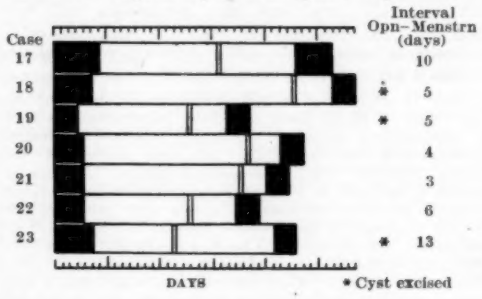
received courses of injections of the hormone of different duration. The daily dose was varied from 20 clinical units to 40 clinical units. It will be seen from the Table that the administration of corpus luteum hormone in doses ranging from 60 clinical units over a period of 3 days to 520 clinical units over a period of 13 days did not delay

Case No.	Control duration of intermenstrual periods in days.			Daily dose of proluton (clinical units).	Injection period in days.	Total dose (clinical units).	Duration of treated cycle in days.
24	..	28	30	40	2	80	33
25	40	28	32	40	11	440	43
26	28	34	31	20	3	60	33
27	27	40	34	20	3	60	35
28	26	24	30	40	6	240	28
29	36	28	35	20	3	60	31
30	34	31	31	20	3	60	34
31	28	29	19	40	10	400	30
32	32	32	33	40	5	200	34
33	32	30	33	40	11	440	34
34	..	34	42	40	11	440	44
35	..	34	32	40	9	360	32
36	30	30	28	40	11	440	36
37	28	26	30	40	13	520	30
38	28	28	30	40	13	520	32

Onset of Menstruation.—Spontaneous in each case.

the onset of menstruation. In Cases 25, 34, and 36 the intermenstrual interval lasted 43, 44, and 36 days, that is 10, 6, and 7 longer than the average duration of three menstrual cycles, but we have observed even greater variations to occur spontaneously in the menstrual rhythm

CHART 3.—*Laparotomy with Manipulation of Ovaries*



of normal women so that no importance can be placed upon this finding. Of great significance is the fact that in each case of this series menstruation occurred spontaneously during the course of the injections.

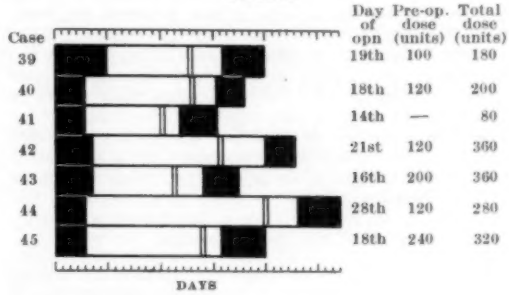
It is apparent from these experiments that the intramuscular injection of proluton in doses of the order of 500 clinical units will not delay the onset of menstruation, and since excision of the corpus luteum is constantly followed by menstruation within at most 48 hours, one may fairly conclude either that the onset of natural menstruation is not determined by degeneration of the corpus luteum but by some other factor, or that the substance injected was incapable of simulating the action of the natural hormone. It was necessary therefore to determine how far injection of proluton would replace the function of the corpus luteum after it had been excised.

EFFECT OF ADMINISTERING PROLUTON BEFORE AND AFTER SURGICAL REMOVAL OF THE CORPUS LUTEUM

Excision of the corpus luteum was carried out in seven patients coming to operation for chronic abdominal disease.

The cases were operated upon about the middle of the menstrual cycle, and injections of proluton in daily doses of 40 clinical units were begun at various times before operation, and continued after the operation until menstruation occurred. The maximum pre-operative injection

CHART 4.—*Excision of Corpus Luteum and Injection of Hormone*



period was 6 days, giving a total dose of 240 clinical units. As in the previous cases the corpus luteum was examined histologically to ascertain its approximate age. In this series, two cases menstruated within 48 hours, two in 72 hours, two in 4 days, and in one menstruation was delayed for 6 days, after which it occurred spontaneously. As will be seen from Fig. 4, the time after operation at which bleeding occurred bore no relation to the dose of proluton administered before the operation.

Although the interval between operation and menstruation was longer than the interval in the first series, where the corpus luteum was excised and no proluton given, hæmorrhage occurred spontaneously in every case.

DISCUSSION

The foregoing observations show that excision of the corpus luteum is constantly followed within 48 hours by menstruation, and it is clear from the control experiments that this result is not due to trauma of the ovaries. At first sight this finding seems to support the theory that the onset of menstruation is caused solely by degeneration of the corpus luteum, and consequent loss of its secretion, a view supported by the fact that the intramuscular injection of hormone before and after excision of the corpus luteum produced a variable but significant delay in the onset of bleeding. It was however not found possible to delay indefinitely the onset of menstruation, artificially induced, nor was there any constant relation between the amount of the hormone injected and the delay produced. It is of course well recognised that the absorption from the tissues of fat-soluble drugs, injected in oily solution, is slow and uncertain, a fact which may serve to explain the relative inefficiency of replacement therapy. If this explanation is correct, it is a significant point which all those who employ corpus luteum hormone for therapeutic purposes should keep in mind. On the other hand, the fact that it was found impossible to delay in any way the onset of natural menstruation, by the injection of doses of the hormone much larger than those which were effective in delaying menstruation induced artificially, raises the important question as to whether the onset of normal

menstruation is determined solely by degeneration of the corpus luteum. Indeed our observations suggest the possibility that naturally recurring menstruation is brought about by some factor other than or additional to degeneration of the corpus luteum, and consequent lowering of the level of luteal hormone in the blood.

SUMMARY

1. Excision of the recent corpus luteum is followed within a period of 1·3 days (32 hours) by menstrual bleeding having all the characters of normal menstruation.

2. Surgical manipulation of the ovaries, leaving the corpus luteum intact, is not followed by menstruation until a much longer period, average 6·1 days.

3. Injection of proluton, a substance having the actions of the corpus luteum hormone, before and after excision of the corpus luteum may cause a delay of 3–6 days in the onset of menstruation.

4. The injection of proluton in doses up to 520 clinical units into normal women during the latter part of the menstrual cycle does not delay the onset of menstruation. It is possible, therefore, that the onset of normal menstruation is not determined solely by degeneration of the corpus luteum.

We desire to express our thanks to Prof. David Campbell for valuable advice and criticism in the performance of this work, and to Dr. Harry Rae, the medical officer of health, for placing the facilities of Woodend Hospital at our disposal.

REFERENCES

Allen, E. (1927) *Contr. Embryol. Carneg. Instn.* **19**, 1.
— (1932) Sex and Internal Secretions, Baltimore, p. 446.
Allen, W. M. (1930) *Amer. J. Physiol.* **92**, 612.
Bartelmez, G. W. (1937) *Physiol. Rev.* **17**, 62.
Butenandt, P., and Schmidt, J. (1934) *Ber. ges. Physiol.* **67**, 1901.
Corner, G. W. (1933) *Medicine, Baltimore*, **12**, 70.
— and Allen, W. M. (1929) *Amer. J. Physiol.* **88**, 326.
Engle, E. T., Smith, P. E., and Shelesnyak, M. C. (1935) *Amer. J. Obstet. Gynec.* **29**, 787.
Hisaw, F. L. (1935) *Ibid*, p. 638.
— Meyer, K. K., and Fevold, H. L. (1930) *Proc. Soc. exp. Biol., N.Y.* **27**, 400.
Kaufmann, C. (1934) *Proc. R. Soc. Med.* **27**, 849, 857.
Smith, P. E., and Engle, E. T. (1932) *Proc. Soc. exp. Biol., N.Y.* **29**, 1225.
Werner, A. A., and Collier, W. D. (1933) *J. Amer. med. Ass.* **100**, 633.
Zuckerman, S. (1936) *Lancet*, **2**, 9.
— and Morse, A. H. (1935) *Surg. Gynec. Obstet.* **61**, 15.

THE VALUE OF PERSISTING WITH DRIP BLOOD TRANSFUSION IN SEVERE PROLONGED HÆMORRHAGE

By Alan W. Cubitt, B.M. Oxon., F.R.C.S. Eng.
SURGICAL REGISTRAR, MIDDLESEX HOSPITAL, LONDON

THE mortality from hæmorrhage is still sufficiently high to cause considerable dissatisfaction with present methods of treatment. The first aim is to stop hæmorrhage by the most direct means possible. In some cases it will be clear that surgery is the method of choice; in others it will be equally clear that surgery offers no prospect of stopping the bleeding. In another group of cases it may be very difficult to decide whether or not an operation gives the best chance of success, and it may be only after careful observation of the progress of the case that the right decision can be made.

In all these circumstances the transfusion of blood may be necessary during the period of hæmorrhage. It may be given with one or more of three main objects; to make possible and safe the direct surgical intervention which may be necessary for the arrest of hæmorrhage; to protect a patient, already dangerously exsanguinated, from the risk of further loss of blood; or to maintain life until the hæmorrhage stops. After arrest of hæmorrhage replacement of some of the blood lost may be desirable to shorten convalescence or for other reasons.

The introduction by Marriott and Kekwick (1935 and 1936) of the continuous-drip method of blood transfusion has overcome most of the technical difficulties of giving slowly and safely adequate quantities of blood over a long period. The quantity of blood required may occasionally be very large. It is above all in those cases in which the necessity for operation is in doubt that the method should make the right decision possible and the right treatment practicable. We can now afford to observe the progress of the patient and estimate the probability of spontaneous arrest of the hæmorrhage without the grave risk to life either of too long delay or too precipitate intervention.

Too low a hæmoglobin content of the blood may endanger life either by giving too small a margin of safety in case of increased hæmorrhage or by so lowering the resistance that the patient succumbs to broncho-pneumonia or some septic complication of his condition. Where prolonged bleeding is occurring from the alimentary tract the question of nutrition becomes of vital importance. Whatever may be our opinion of the influence of diet on the continuance of hæmorrhage, it can hardly be doubted that malnutrition is an added factor of danger and that intravenous and rectal alimentation over a prolonged period is a poor substitute for the normal method. Nourishment can be given by mouth with greater confidence if blood can be supplied in quantities sufficient to keep the patient above the danger level.

This paper is written and the cases recorded in the hope of showing that when really large amounts of blood are necessary they can usually be obtained and can be safely given and that persistence and faith may be rewarded by the survival and restoration to health of patients who a few years ago would almost certainly have died of hæmorrhage.

CASE 1.—A man of 42 who had been in the army and had lived in Hong-Kong had had intermittent attacks of obstructive jaundice for four months, sometimes accompanied by pain. The jaundice caused a very trying pruritus. He had some indigestion. He had had similar symptoms in 1928 and an operation in a military hospital had relieved them. Details were not available, but he was said to have had a cyst in the region of the pancreas. On examination he was moderately jaundiced, the urine contained bile, and the stools were clay-coloured. There was a right upper paramedian scar and a large cystic swelling apparently attached to the right lobe of the liver and moving with it; it extended almost down to the umbilicus; it was not tender. Radiography showed areas of calcification at the periphery of a spherical tumour. Casoni and hydatid complement-fixation tests were negative. The Wassermann reaction was negative.

The alternative diagnoses appeared to be hydatid cyst of the liver or pancreatic cyst. When first admitted three months earlier, operation was not advised. The attacks of jaundice, however, had increased in frequency and severity and irritation was intolerable. A laparotomy was performed by Sir Alfred Webb-Johnson through a midline incision above the umbilicus. The cyst was found to be pancreatic in origin; the common bile-duct, duodenum, and some very large veins were stretched over it and dilated. It was impossible to remove the cyst and it was therefore marsupialised. The fluid in the cyst was clear and contained diastase, lipase, trypsin, urea, and chlorides. About nine days after operation he began to complain of epigastric pain and anorexia and the upper abdomen became very distended and tympanitic; the pain became very severe. It was

supposed that this was due to obstruction of the duodenum by the marsupialised cyst and this supposition was confirmed by radiography after a small barium meal. After a few days the symptoms improved, but it was noted that he looked very pale, and on the fourteenth day after operation he had a very large hæmatemesis, followed by a large stool consisting mostly of changed blood.

The hæmoglobin percentage was estimated as 30; the patient's blood-group was 4 (Moss); the blood pressure was 85 systolic, 60 diastolic. A continuous-drip blood transfusion was started. Bleeding continued for 11 days; there were several hæmatemeses, but the main blood loss was by the bowel. The source of bleeding was presumed to be varices in the duodenum caused by prolonged partial obstruction of the veins stretched over the cyst; the uncertainty of the cause and site of the hæmorrhage put operation out of the question. For the first two days water only was given by mouth and saline given by rectum, but rectal alimentation was very unsatisfactory because of the frequent large melæna stools, and as bleeding showed no sign of abating, Meulengracht's diet was started. Injections of Hæmoplastin and calcium gluconate were given from time to time: 11·7 litres of blood were given by continuous-drip blood transfusion within ten days. Some thrombophlebitis occurred and the cannula was changed into a different vein eight times, with an interval of a few hours on three occasions, the longest interval being 28½ hours. During these intervals the hæmoglobin percentage of the blood fell rapidly, massive melæna continued, and the transfusion had to be resumed. It was our deliberate policy not to raise the hæmoglobin percentage above 50 as long as bleeding was still going on.

On the eleventh day there was no more melæna; the hæmoglobin was raised to 60 per cent. and the transfusion was stopped. The hæmoglobin remained at 60 per cent. for 24 hours and a further 1·42 litres of blood raised it to 80 per cent. The total quantity of blood transfused in 13 days was 13·12 litres; we think this must be a record quantity in the time. There was no more bleeding and progress thereafter was rapid. The discharge from the cyst lessened after several injections into it of 1 in 400 silver nitrate, and 14 weeks after operation the sinus was healed and the patient a fit man. During the transfusion occasional pyrexia and thrombophlebitis were the only untoward events. Invariably while the transfusion was proceeding the patient expressed himself as "feeling fine," but during the intervals when the hæmoglobin was at a low level he felt very weak and ill.

The blood was obtained from 24 donors; they were all of Group 4 and their blood was also tested for compatibility directly with the patient's serum. The first two donors were from the Red Cross Society's Transfusion Service because the blood was required urgently and in the middle of the night. All the other donors were men who worked at the factory where the patient was employed. Eighty-six men were grouped, in batches of a dozen or more at a time. The men and their employers were very anxious and willing to help and many of those who were found to be unsuitable were most disappointed.

CASE 2.—A man, aged 35, who had had a gastro-jejunostomy for duodenal ulcer six years previously. For the last six months he had had pain after food and recently there had been loss of weight. He was admitted with signs and symptoms of internal hæmorrhage, though no hæmatemesis or melæna had yet occurred. On admission: hæmoglobin, 30 per cent.; blood pressure, 120/70; pulse-rate 120. Transfusion was commenced within 1½ hours of admission and 7·08 litres of blood were given by the continuous-drip method over a period of 80 hours with an interval of 9½ hours. When it was evident that hæmorrhage was still continuing rapidly the hæmoglobin percentage was raised to 50 and laparotomy was performed 28 hours after the commencement of the transfusion. A large spurting artery of the transverse mesocolon was found in the base of an anastomotic ulcer; this was ligatured and the opening sutured. The transfusion was continued during and after operation until the hæmoglobin percentage was 70. Good recovery.

It is sometimes objected that such large quantities of blood as these are rarely obtainable. It is noteworthy that of the 37 donors bled for these two cases, only four were Red Cross Society's donors. A patient's workmates are often a willing and valuable source of blood, and in other cases, if the onus of responsibility for finding donors is firmly put upon the relatives, sufficient blood is usually obtainable.

I wish to thank Sir Alfred Webb-Johnson and Mr. E. W. Riches for permission to publish these cases and Dr. F. Knights, who performed the transfusions.

REFERENCES

Marriott, H. L., and Kekwick, A. (1935) *Lancet*, **1**, 977, and **2**, 78.
— — (1936) *Proc. R. Soc. Med.* **29**, 337.

CYSTICERCOSIS AS A CAUSE OF EPILEPSY IN A DIABETIC INDIAN

BY R. L. HAVILAND MINCHIN, M.D. Edin., I.M.S.
PHYSICIAN TO THE GOVERNMENT GENERAL HOSPITAL, AND ADDITIONAL PROFESSOR OF MEDICINE, MEDICAL COLLEGE, MADRAS

No case of cysticercosis giving rise to fits in an Indian has yet been described, though MacArthur (1933) has reported 22 such cases in British soldiers returning home after service in India. It is probable though of course not proved that these cases were infected with cysticerci derived from their own worm. Recent work on the development of the cysticercus stage of *Tænia saginata* (Penfold, Penfold, and Philips 1936) shows that in cattle, its normal host, this cyst never lives more than nine months, and then stays only in the muscles and never enters the central nervous system of the infected animal. Research is certainly required to show whether the *Cysticercus bovis* develops and dies with such regularity in other hosts and to calculate the duration of *Cysticercus cellulosæ* in the infected pig and less normal hosts.

In July, 1936, I saw the Hindu patient described below, and requested that he should be transferred to my wards in the Government General Hospital, Madras, from the Mental Hospital, as the case appeared to be a combination of diabetes mellitus and idiopathic epilepsy, two diseases which an extensive search in the published reports has failed to reveal as occurring simultaneously, and which Joslin (1928) has been unable to discover among the 6000 hyperglycæmias he investigated. Further, the combination of these two conditions would disprove the hypothesis I have advanced (Minchin 1933) that idiopathic epilepsy is associated with hyperfunction of the islets of Langerhans, and would also show that the beneficial results reported from dietetic measures to control epileptic hypoglycæmics by Thomas (1936), and the results of partial pancreatectomy described by Seale Harris (1933) and others, were due to some other cause than the consequent rise of the blood-sugar level.

CASE-HISTORY

The patient belonged to a non-vegetarian caste and had been admitted to the Mental Hospital in November, 1935. He was mentally confused and would give very little account of himself. No relations or friends could be traced to give any particulars of the onset of his disease or any previous medical history.

During the time he was in the Mental Hospital no improvement took place in his mental condition and periodic typical major epileptic fits occurred, there being 6 in January, 5 in February, none in March, 1 in April, none in June, and 2 in July. There was no prodromal

signs or symptoms of the fits. During this period the physical condition deteriorated. In June, 1936, a glucose-tolerance curve was obtained which gave the following figures:—

Fasting blood-sugar.	½ hr.	1 hr.	1½ hr.	2 hr.
308 mg. per 100 c.cm. ..	360 ..	364 ..	444 ..	400

Sugar was present in the urine throughout the examination. On July 20th the opportunity arose of taking a specimen of blood immediately after a fit and this was found to contain 500 mg. per 100 c.cm. of glucose. For the reasons mentioned above he was transferred to the General Hospital. On admission he was found to be very emaciated; there was considerable mental confusion and he was unable to give any account of himself.

Examination.—The abdominal reflex was active on both sides; plantar reflexes could not be obtained; the deep reflexes were absent; the pupils reacted to light and accommodation.

Pulse-rate 80, no irregularities; heart, normal dimensions, sounds clear and closed; blood pressure 115 mm. Hg systolic, 80 diastolic. There was advanced pulmonary tuberculosis in both lungs.

Laboratory reports.—Urine contained 9 per cent. sugar but no ketone bodies. Blood showed secondary anæmia but no eosinophilia. Wassermann and Kahn tests negative. Stools: no ova, amœba, or cysts detected. Glucose-tolerance curve taken on August 3rd:—

Fasting	½ hr.	1 hr.	1½ hr.	2 hr.
267 mg. per 100 c.cm...	333 ..	340 ..	440 ..	440

Sugar was present in the urine throughout the test. Electrocardiogram showed a slightly increased size of the P wave but no other abnormalities. Cerebro-spinal fluid: Wassermann negative.

From these examinations the possibility of the fits being due to syphilitic infection was ruled out and it was considered that the condition might be due to a cysticercal infection of the brain. The whole of the body was carefully examined for the presence of palpable cysts but none were discovered.

On August 11th the skull was X rayed. No calcified cysticercal cysts were demonstrated in spite of four examinations, the only abnormality detected being a shallowness of the pituitary fossa. Similar X ray examinations of the thorax and abdomen failed to show any calcified cysts. Unfortunately the limbs were not submitted to X ray examination.

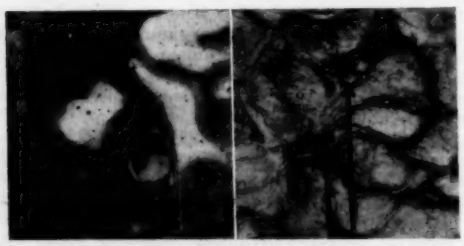


FIG. 1.—Cysts seen in the left (on the left) and right cerebral hemispheres.

The patient remained in hospital and up to the end of September his condition improved mentally and physically under strict dietetic measures and administration of small doses of insulin, so much so that he was able to take a fairly intelligent interest in his surroundings and gained 10 lb. in weight. In the first week of October he started to run a high temperature and signs of more tubercular activity appeared in his chest and the percentage of sugar in the urine increased in spite of insulin injections. He died on Oct. 20th.

Post-mortem report.—Chronic ulcerative phthisis left lung and tuberculous broncho-pneumonia of right lung with thickened pleura on both sides. Empyema of sphenoidal air sinus. In the pancreas the islets of Langerhans were few and far between and those that were seen were small and atrophic. Alimentary canal normal; no tapeworm present.

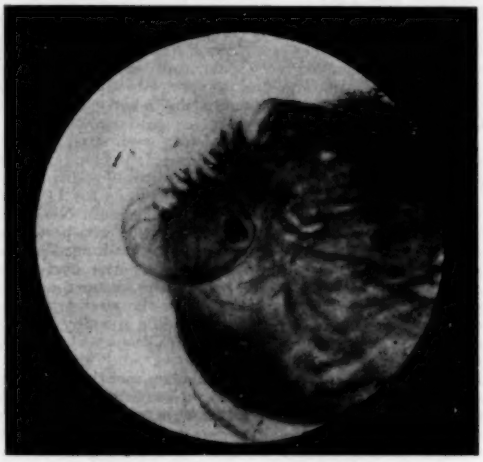


FIG. 2.—Photomicrograph of scolex from cysticercus in pars basalis, showing double row of hooklets.

Brain.—Weight 2 lb. 4 oz.; rather small in size. An opalescent slightly milky fluid spurted out from the left temporal lobe during the removal of the brain from the cranial cavity. A cyst of the size of a small pea with a milk spot was seen in the right anterior central sulcus about 1 in. above the point of division of the stem of the Sylvian fissure. A whitish nodule of the size of a large pea projecting on the surface of the pars basilaris of the left side (Fig. 1, right). Above this the cortex of the posterior ends of the middle frontal gyri was softened. The left temporal pole was soft, cystic, and collapsed. The gyrus rectus and the medial orbital gyrus of the left frontal lobe appeared to be softened. On making antero-posterior vertical sections through the left half of the brain: (1) There was a cavity of the size of a walnut in the anterior part of the temporal lobe; its wall was very thin below and had clearly been torn during removal of the brain (Fig 1, left). (2) A cavity about 1 in. long, ½ in. broad, and ½ in. deep was present ½ in. above the medial orbital gyrus and gyrus rectus, the wall being ragged. (3) An almost circular cavity ½ in. in diameter outlined by a capsule was seen in the pars basilaris containing a cysticercus which showed under the microscope a scolex with a double row of hooklets (Fig. 2).

DISCUSSION

From the pathological report it seems that the cause of this patient's epileptic fits was a cerebral infection with the cysticercus of *Tænia solium*. It is unfortunately impossible to state the duration of the infection, but we are justified in assuming that it is over 12 months, since fits have been present for this period. Sections of the cysticercus removed from the frontal lobe show no sign of degeneration and it is reasonable to assume that these were living before being placed in fixing material. MacArthur was unable to give any idea of the duration of the infection in his cases. In one patient the fits came on during treatment for tapeworm, while in another fits first started four years after removal of a worm.

It is interesting to note that in his cases as in the one described, no calcification of the cysticerci was found in the brain, and in the other specimens in the Madras Medical College museum where a brain infestation is present no calcification has taken place. Morrison (1934) has described the only case where

calcification of cysts in the brain associated with epileptic convulsions has been found.

SUMMARY

A case is described of epilepsy in a diabetic Indian due to infestation of the brain with *Cysticercus cellulosæ*. This is the first noted in an Indian though there have been cases reported in British soldiers. There is a need for research on the life-history of this cysticercus cellusi. The importance of finding some definite cause for epileptic fits in hyperglycæmia is demonstrated.

My thanks are due to Dr. H. S. Hensman for allowing me to investigate this case, to Dr. A. Vasudevan for pathological reports, and to Captain L. W. Barnard for the photographs.

REFERENCES

Harris, S. (1933) *J. Amer. med. Ass.* **100**, 321.
Joslin, E. P. (1928) Diabetes Mellitus, Philadelphia.
MacArthur, W. P. (1933) *Trans. R. Soc. trop. Med. Hyg.* **26**, 525.
Minchin, R. L. H. (1933) *J. ment. Sci.* **79**, 659.
Morrison, W. K. (1934) *Brit. med. J.* **1**, 13.
Penfold, W. G., Penfold, H. B., and Philips, M. (1936) *Med. J. Aust.* **1**, 417 (quoted *Lancet*, 1936, **2**, 752).
Thomas, C. R. (1936) *J. Tenn. med. Ass.* **29**, 21.

ACUTE PAROTITIS AS A MANIFESTATION OF LATENT URÆMIA

By Reginald T. Payne, M.S., M.D. Lond., F.R.C.S. Eng.

CASUALTY SURGEON TO ST. BARTHOLOMEW'S HOSPITAL

It does not appear to be generally recognised that in certain circumstances acute parotitis may be an indirect or even early manifestation of unsuspected uræmia. That this is actually the case has been brought home to me in many instances during the past few years. This type of parotitis is only likely to arise in patients who are already ill from some other disease—particularly in conditions in which latent uræmia may occur—such as gastric hæmorrhage, acute infections, insanity and in the post-operative state. The uræmia, therefore, may or may not be of extra-renal type, and, in addition, is a type which is not accompanied by œdema. The association between established uræmia and acute parotitis is well known, but I do not believe it is recognised that the parotitis may at times be the first sign of a latent uræmia, or even that the parotitis coming on after gastric hæmorrhage, &c., may have a uræmic background.

Ætiology

In such uræmic states, ideal conditions are present in the mouth for the development of an ascending parotitis. The mouth is dry as the result of the suppression of almost all salivary secretion, and the tongue and lips are either parched or thickly furred. The bacterial content of the mouth is much increased, and it has been demonstrated by Seifert (1926) that this is especially true of the *Staphylococcus aureus*, at least in the post-operative types. Bacteriologically, this type of acute parotitis is almost always due to *S. aureus*. From the pathological point of view, the process is best conceived as a diffuse carbuncular infection of the gland extending along the ramifications of the ducts. This carbuncular nature is well demonstrated in post-mortem specimens.

The prognosis of acute parotitis in these uræmic patients is not good. The presence of some antecedent serious disease and the existence of some degree or other of uræmia make the outcome uncertain. As regards acute staphylococcal parotitis itself, this is always a serious disease owing to the anatomical configuration of the gland and its dense capsule. The recent work of Christiansen (1935) on uræmia as the cause of death after massive gastric hæmorrhage has a bearing on this subject. He has shown that latent uræmia is often the cause of death after hæmorrhage from peptic ulceration. The high incidence of parotitis in this disease, which was recorded by Rolleston and Oliver in 1909, suggests at least that the parotitis has a uræmic basis. The factor of buccal infection is obviously an important one leading to acute parotitis, and this is brought about largely through the absence of chewing. The latent uræmia that is present in many of these patients leads to considerable suppression of salivary secretion. It is the combination of exaltation of the buccal flora, especially the staphylococci, together with absence of parotid secretion, that leads to the development of ascending parotitis. The condition is comparable to the development of ascending pyelonephritis after prostatectomy. Rolleston and Oliver say: "Hone attached more importance to antecedent hæmatemesis than to oral starvation as a factor in the causation of this form of parotitis." This would fit in with the present conception of the sequence of events—namely, hæmatemesis, uræmia, parotitis.

Treatment

Acute parotitis as an early sign of latent or developing uræmia is especially likely when the patient already has some antecedent serious disease. I have so often made a diagnosis of uræmia in unsuspected cases on the grounds that the patient had an acute parotitis associated with some other disease that I cannot believe that parotitis is often considered as possibly the first manifestation of uræmia. Treatment of these cases is not considered here in detail, but the parotitis must always be taken extremely seriously, since it may well prove a factor bringing about a fatal outcome. If resolution of the condition cannot be brought about very rapidly by conservative measures, there should be no hesitation in exposing the gland freely by the usual curved incision, and making a series of transverse incisions into the fascia and the gland itself. The absence of any gross collection of pus should not disconcert the surgeon. Pus will probably pour from the wound within 24 hours of operation. In the post-mortem examples of acute parotitis to which I have referred there was no gross collection of pus, but the whole duct system of the gland was in a state of purulent infiltration and the gland itself was about six times normal size. In acute parotitis, death may occur long before there is any attempt at localisation of an abscess in the gland. Finally, recognition of the parotitis as a possible manifestation of uræmia may lead to adequate treatment of the latter.

REFERENCES

Christiansen, T. (1935) *Hospitalstidende*, **78**, 561.
Seifert, E. (1926) *Dtsch. Z. Chir.* **198**, 387.
Rolleston, H. D., and Oliver, M. W. B. (1909) *Brit. med. J.* **1**, 1296.

Central London Ophthalmic Hospital.—The Zunz Fund, in accordance with the policy described in our issue of March 20th (p. 730), has allocated £8000 to this hospital. The year's surplus has been used to defray part of the capital expenditure on improvements. The hospital has become affiliated to the Middlesex Hospital where nurses will complete their training.

CLINICAL AND LABORATORY NOTES

TUBERCULOUS VULVOVAGINITIS

REPORT OF A CASE IN INFANCY

BY VALENTINE A. J. SWAIN, M.R.C.S. Eng.

LATE HOUSE SURGEON, HOSPITAL FOR SICK CHILDREN, GREAT ORMOND-STREET, LONDON

TUBERCULOSIS of the vulva and vagina is the rarest form of clinical genital tuberculosis, and according to Norris (1928) occurs in about 2 per cent. of all tuberculous lesions of the genital tract. Clifford White (1917) states that a quarter of the cases of this disease occur in children; adults are commonly affected at the ages of 30–40. The following report of this disease in an infant shows some interesting features.

CASE REPORT

A female infant, aged 17 months, was admitted to hospital on account of having difficulty in passing water. It was first noticed about two weeks before admission that she cried during micturition and seemed to pass little urine at a time. One week later it was noticed that the vulval region was swollen and sensitive to touch.

Past history.—A full-term baby; only child; birth weight 6½ lb.; breast-fed till 8½ months old.

Family history.—It was ascertained that there was a strong family history of pulmonary tuberculosis on the father's side. Later it was found that both parents had active tuberculosis; the mother has since died of phthisis.

On examination she was a pale, ill-looking child, and underweight (19 lb.). Examination revealed an œdematous and inflamed vulva; there was an ulcerated area on the left postero-lateral aspect of the vaginal orifice; this was very tender. The inguinal glands on both sides were palpably enlarged, but not tender nor fluctuant. Apart from a few small glands enlarged in the neck, the child appeared otherwise quite normal.

The urine on admission was sterile. A vaginal smear showed some pus cells and mixed organisms; no gonococci were seen. One week after admission the inguinal glands became swollen and fluctuating. They were aspirated and a few c.cm. of thick blood-stained pus was withdrawn; this contained a few Gram-positive cocci; a Ziehl-Neelsen film showed many tubercle bacilli; on culture only coliform bacilli were grown. The glands were later aspirated again on several occasions as they refilled. Animal inoculation of the pus produced a tuberculous reaction.

Five weeks after admission the child was examined under an anæsthetic. The inguinal glands were incised and curetted. There was an ulcerated area in the region of the left posterolateral aspect of the vulvovaginal orifice; the right side was slightly involved. The edges were irregular, unindurated, and definitely undermined. The base was irregular in depth and on its surface was bleeding granulation tissue. It extended for about 1 in. into the vagina. There was no evidence of any sinus. The cervix uteri appeared healthy and normal. Rectal examination revealed no abnormality in the pelvis. A section of the ulcer margin was excised for biopsy. Dr. D. N. Nabarro reported that the section showed well-formed giant cells and systems surrounded by lymphocytes; there was widespread endothelial cell proliferation. Staining in a Ziehl-Neelsen film showed scanty tubercle bacilli to be present.

It was thought that there might have been a focus in the urinary tract, primary to that on the vulva. The bladder was cystoscoped by Mr. T. Twistington Higgins; there was some urethritis; the bladder neck was somewhat reddened and congested; both ureteric orifices appeared normal, functioning with a clear efflux. It was thought inadvisable to catheterise the ureters in view of the negative findings and the risk of spreading infection. Uroselectan films appeared normal. The urine was examined from time to time and no tubercle bacilli were found. Other investigations showed: Mantoux test, 1/10,000, was positive; Frei's test for lymphogranuloma inguinale was negative. Blood count, white cells 17,500 per c.mm., red cells 3,820,000 per c.mm., hæmoglobin 55 per cent.; colour-index 0·7. A radiogram of the chest revealed a calcareous node at the right hilum.

Treatment.—The local condition was treated with X ray irradiations and soothing applications. In addition, general ultra-violet ray therapy was given, as well as general tonics of iron and cod-liver oil.

Progress.—The child developed subsequently bilateral otitis media following measles; it was a streptococcal infection; she later developed mastoiditis, which necessitated a mastoidectomy; this was followed by suppurative adenitis in the neck. The patient is now having treatment at a sanatorium where she is making very slow but favourable progress in both her local and general condition.

COMMENTARY

Jameson (1935) in a monograph describes this condition fully in its many aspects with adequate references to other reports. The lesion on the vulva usually occurs in people with tuberculosis in other parts of the body. Primary lesions, however, have been reported, but they are very rare, for negative clinical evidence of other tuberculous foci is insufficient grounds for regarding a case as being primary in origin, and many cases post mortem will reveal microscopic evidence of tuberculosis at other sites.

The mode of infection of the lower genital tract in every case is difficult to ascertain. The vulva and vagina may become infected secondarily from above from lesions in the upper genital or urinary tract. Descending spread may also occur from other sites by means of the blood or lymphatic stream. Direct inoculation of the genitalia can occur by contamination with the hands of a phthisical subject, as in a baby requiring frequent attention to its toilet. In adults, the condition can have a venereal origin, but this is uncommon.

In the case described the upper genito-urinary tract appeared clinically free from tuberculosis, while the lungs showed evidence of past infection, in that a calcified gland is present in the hilar region. This is not surprising as the child's parents both had active pulmonary tuberculosis and that she was breast-fed until 8½ months old. The pulmonary lesion is probably of earlier origin than that of the vulva, and the latter may have become secondarily infected with dissemination of the disease. Alternatively, it is possible that the vulva may have become directly contaminated by the parents during attention to the baby's toilet. For it has been shown by Jameson (1935) at the Saranac Laboratory in New York that the introduction of a strain of tubercle bacilli into the vagina of an animal (guinea-pig) can produce tuberculous lesions in the lower genital tract. This is greatly enhanced if the animals are first sensitised by a previous inoculation with a strain of tubercle bacilli. Trauma, also, increases the liability to develop these lesions. Jameson generalises by analogy that "even in humans tuberculosis of the vagina and vulva may be of the ascending type much more frequently than is suspected at the present time," and that "upper tract lesions are usually descending infections." He gives further clinical and pathological evidence to substantiate this statement.

Tuberculosis of this region occurs either in an ulcerative or hypertrophic form; the former is the

commoner. The ulcers may be single or multiple and may vary in character, forming confluent ulcerated areas or sinuses. The inguinal glands are involved late as a rule. Dysuria, pruritus, and swelling of the vulva with some discharge are the commonest symptoms. On examination other tuberculous lesions may be found elsewhere. Diagnosis may be difficult, for typical tuberculous giant-celled systems are often scanty in the histological sections, and the Koch's bacilli may be few.

I am indebted to Mr. T. Twistington Higgins for his interest and permission to publish the report of this case, which was under his care at the Hospital for Sick Children, Great Ormond-street; also to the pathology department for the various investigations; and to Mr. D. Martin for the photograph.

REFERENCES

Jameson, E. M. (1935) Gynæcological and Obstetrical Tuberculosis, London. pp. 52-59.
— *Ibid*, p. 42 et seq.
Norris, C. C. (1928) Quoted by Jameson.
White, C. (1917) New System of Gynæcology, vol. i, p. 595.

BILATERAL CYSTIC SWELLINGS OF THE THIGHS OF TUBERCULOUS ORIGIN

By E. A. Devenish, M.S. Lond., F.R.C.S. Eng.

ASSISTANT TO THE SURGICAL UNIT, UNIVERSITY COLLEGE HOSPITAL

A PAINTER, aged 18, was admitted to hospital on June 19th, 1936, complaining of a lump in the upper part of the left thigh.

Eight years before admission he had fractured the left femur in its middle third, and about six months after this he noticed the swelling in his left thigh. The lump had gradually got larger, and for the last two years he had pain in the region of the lump. The pain was gnawing, and was worse at night and on lying down. It was not brought on by walking, but running produced some pain. He had never been ill before, did not suffer from night sweats, and had no history of familial tuberculosis.

He was a well-covered stocky youth, and on standing naked the bulging of the upper part of his thighs gave him a disproportionately muscular appearance in the lower half of his body (Fig. 1). He walked without a limp, but lurched a little to the left when standing on the left foot. He was apyrexial and his pulse- and respiratory rates were normal.

FIG. 1.—Photograph taken after excision of left cyst. The discoloration of the skin is due to flavine.

Left thigh.—On its antero-lateral aspect was a large, smooth, tense, fluctuant swelling about 7 by 5 in., which extended upward to the iliac crest, outward to the great trochanter, and inward to the femoral vessels. It filled up the space so defined and projected beyond the normal outline of the thigh by about 4 in. The overlying skin was not attached to the mass and was normal in all respects.

Right thigh.—There was a similar swelling in the corresponding situation in the right thigh. This extended well into the buttock, deep to the gluteus maximus, and fluctuation was demonstrable between the swelling of the thigh and of the buttock. The patient had not noticed the swelling of the right thigh.

Hip-joints.—There was considerable limitation of internal rotation of both joints with slight limitation of flexion and abduction of the left joint. The lower limbs were equal in length. No abnormality was discovered on examination of the spine or of the rectum, and fluctuation could not be obtained between the swelling of one thigh and that of the other.

Radiograms of the hip-joints and femora showed no abnormality beyond a small oval area of rarefaction in the left great trochanter (Fig. 2). A radiogram of the chest showed evidence of previous tuberculosis in the form of densely calcified glands at both hila and dense shadows in the upper third of the right lung field. There was no evidence of present activity.

FIG. 2.—Radiogram of left great trochanter showing area of rarefaction.

Operations.—The swelling of the left thigh was aspirated and thick opaque yellow fluid containing cholesterol crystals and a few polymorphs and lymphocytes was obtained. It was sterile on culture and did not contain tubercle bacilli, as was shown by a negative guinea-pig inoculation with this fluid. On July 6th the left thigh was explored and a large cyst adherent to the surrounding structures, situated deep to the deep fascia of the thigh and extending backwards deep to the anterior border of the gluteus maximus, was dissected out. The main cyst communicated by a narrow neck with a small abscess cavity in the great trochanter. This abscess cavity was lined by smooth sclerosed bone and was filled with granulation tissue. Cultures from the cyst fluid and from the granulation tissue were sterile. The wound healed by first intention. On July 30th the right thigh and buttock were explored. An exactly similar cyst was found situated deep to the gluteus maximus and extending anteriorly between the tensor fascia femoris and the vastus lateralis. Deep to the insertion of the gluteus medius was a separate small abscess cavity lined with granulations and lying over an area of bare bone about ¼ in. in diameter. No connexion of the cyst cavity with the hip-joint was demonstrable in either thigh. A portion of the cyst wall excised from the right thigh was injected into a guinea-pig, which 6 weeks later had developed miliary tuberculosis.

Morbid histology.—The tissue excised consisted of the cyst walls and the granulation tissue curetted from the cavity in the left great trochanter. The cysts were identical in appearance both to the naked eye and on microscopic examination. Each consisted of a tough, fibrous wall about ¼ in. thick, lined on its inner surface by yellow caseous material which when washed away revealed a granular surface like that of morocco leather. The outer surface of the cysts was adherent to the surrounding structures and had been separated from them by sharp dissection.

On microscopic examination the granulations from the abscess cavity in the bone were typical tuberculous granulations. No bone trabeculæ were present. The wall of each cyst was composed of three layers (Fig. 3). (1) An outer layer of adult fibrous tissue adherent to the surrounding structures. (2) A middle layer of

tuberculous granulation tissue. (3) An inner layer of caseous material. An unsuccessful search was made for tubercle bacilli in the sections cut, but the nature of the

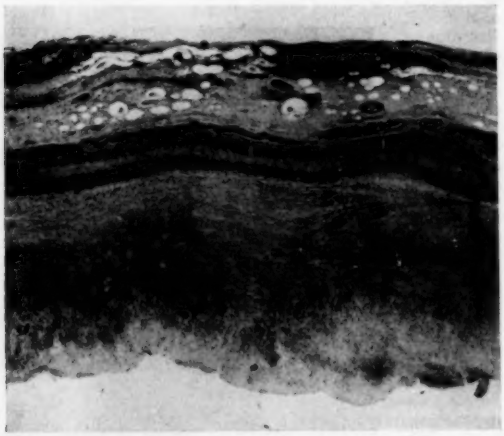


FIG. 3.—Microphotograph of whole thickness of cyst wall. (× 8.)

lesion was proved by the positive guinea-pig inoculation with material from the wall of the cyst.

The cystic swellings in the thighs were almost certainly chronic abscess cavities arising from comparatively small bone lesions. The unusual feature was the symmetry of the swellings which on first sight gave the patient the appearance of having some femoral deformity. This symmetry is explicable on the supposition that the disease began in the great trochanters if, as is probable, the initial bone lesions were embolic in origin. This probability is supported by the presence in the right lung of evidence of an old tuberculous lesion from which the emboli could have arisen.

The case belongs to that class of tuberculous lesions in which a small bony focus is associated with a large abscess in the surrounding soft parts, the commonest example being caries of the spine, in which a small lesion in one of the vertebral bodies is associated with a large psoas abscess.

CASE OF STREPTOCOCCAL MENINGITIS TREATED WITH PRONTOSIL

By I. Vitenson, M.R.C.S. Eng.
AURAL SURGEON TO EAST HAM MEMORIAL HOSPITAL; AND
G. Konstam, M.D., M.R.C.P. Lond.
PHYSICIAN TO EAST HAM MEMORIAL HOSPITAL; ASSISTANT PHYSICIAN TO WEST LONDON HOSPITAL

In a leading article in The Lancet (1936) and in an annotation (1937) the importance of trying Prontosil or its derivative *p*-aminobenzenesulphonamide in severe forms of streptococcal infection was urged. This has prompted us to publish the following case of hæmolytic streptococcal meningitis complicating acute otitis media, which was treated with prontosil in addition to orthodox surgical measures.

Although it is fully realised that no inferences can be drawn from an isolated case, the favourable result might encourage others to test this chemotherapeutic agent under similar circumstances. Available statistics bear witness to the heavy mortality in those cases of otitic meningitis in which the cerebro-spinal fluid is infected with organisms, particularly where they are sufficiently numerous to be seen in films from the centrifuged fluid. Jory (1935) in 39 cases at St. Bartholomew's Hospital of meningitis complicating acute and chronic otitis media reported 11 in which the cerebro-spinal fluid contained hæmolytic and non-hæmolytic streptococci; 9 of these patients died and 2 recovered. Gangl and Zange (1935) collected 70 such cases, 16 of which contained hæmolytic and non-hæmolytic streptococci in the cerebro-spinal fluid; 13 of these died and 3 recovered. Neumann (1934) in 59 cases found streptococci in the cerebro-spinal fluid in 16 instances; the proportion of deaths to recoveries was as in the previous series 13 to 3.

A boy aged 10½ was admitted to the East Ham Memorial Hospital on Nov. 13th, 1936, with a left-sided otitis media of three weeks' standing. For nine days he had suffered from mucopurulent otorrhœa without pain or tenderness over the mastoid; the temperature did not rise above 99·2° F. except on two occasions when it was 100°. On the tenth day he suddenly developed a temperature of 104·6°, without however any exacerbation of his aural symptoms. A left Schwartze operation was performed by one of us (I. V.) and an extensive osteitis of the mastoid process with pus and granulations in many cells was found. The lateral sinus was not exposed and the lamina of bone covering it was apparently normal; the tegmen antri was removed over an area 6 mm. by 5 mm. and there was no evidence of extradural abscess; the cells in Trautmann's triangle as well as those in the apex of the mastoid process were cleared out and the operation was completed.

Seven days later the temperature became normal and the wound was healing satisfactorily, the aural discharge having ceased.

On the twelfth day after operation he woke up with severe generalised headache, photophobia, vomiting, and a temperature of 104·1°. Kernig's sign with slight neck rigidity was present and the ophthalmic disc margins were blurred. At lumbar puncture the cerebro-spinal fluid was under pressure and contained 3690 cells of which the large majority were pus cells. Cocci were seen in films and on culture they proved to be hæmolytic streptococci; the protein content of the cerebro-spinal fluid was 80 mg. per 100 c.cm.

On the same evening the mastoid wound was reopened and Neumann's operation for meningitis was performed; the posterior meatal wall was removed and the middle fossa dura was widely exposed by the removal of the tegmen tympani and antri and that part of the mastoid bone in contact with the dura. The lateral sinus and the posterior cerebellar dura were uncovered and finally the superior angle of the petrous bone was removed. At the termination of the operation the dura from both fossæ was seen to be tense and although it bulged into the mastoid cavity it was not incised.

Nowhere was there macroscopic evidence of disease of the meninges or extension of the osteitis. During the following twenty-four hours he was delirious and by the evening he had sunk into a deep coma. Lumbar puncture was performed and 25 c.cm. of cerebro-spinal fluid which was under increased pressure were drawn; this was followed by general improvement. Three days later a right external rectus paresis appeared but there was no evidence of involvement of the other ear, and the diplopia disappeared two weeks later. The papilloedema at first increased and remained for four weeks after operation despite an amelioration of the symptoms. Convalescence was interrupted by six days of continuous pyrexia and the temperature became normal twenty days after the second operation. Progress was thenceforward uneventful.

Post-operative treatment consisted in daily lumbar puncture for thirteen days and the administration of

prontosil 10 c.cm. parenterally b.d. and 2 prontosil album tablets orally b.d. The cerebro-spinal fluid became sterile on the seventh day and the cells which at first had numbered 3690 per c.mm. fell to 35 per c.mm. thirteen days after the operation.

Although prompt operation will save a proportion of such cases, the moribund condition of our patient the day after operation led one to expect a fatal issue.

REFERENCES

Gangl, O., and Zange, J. (1935) *Beitr. Hals-, Nas. u. Ohrenheilk.* **31**, 369.
Jory, N. (1935) *Proc. R. Soc. Med.* **28**, 532.
Lancet (1936) **2**, 1339.
— (1937) **1**, 211.
Neumann, H. (1934) *Rev. Laryng., Paris*, **55**, 1.

MEDICAL SOCIETIES

ROYAL MEDICO-CHIRURGICAL SOCIETY OF GLASGOW

A MEETING of this society was held on March 19th, with Mr. GEORGE H. EDINGTON, the president, in the chair. He showed a case in which the radial nerve was operated on two years ago for

Traumatic (Fracture) Paralysis

A schoolboy, aged 14, was admitted to the Western Infirmary on Jan. 23rd, 1935, with fracture in the middle of the shaft of the right humerus, having been knocked down by a motor-car a few hours previously. Examination on the following day showed marked musculo-spiral paralysis. The fracture united and the boy was discharged in a splint. Two months later the paralysis had not improved, and on March 28th the radial nerve was exposed through a lateral incision and found nipped between the fragments of the bone. The nerve was divided and freed above and below the fracture, and through a medial incision the proximal part was displaced to the front of the arm (as recommended by Stiles) and sutured to the distal part under cover of brachialis anticus. Recovery of power was very slow and when the patient was seen towards the end of July, 1935, there was little if any change; electrical testing of muscles involved showed no response to faradic and a weak response to galvanic current. When seen early in October, 1936, he had fair use of hand and arm. The limb was much thinner than its fellow. Paralysis of extensor ossis metacarpi and of primi internodii pollicis was noted. By mid-February, 1937, power was greater; the boy was able to play ping-pong but was doubtful of trying tennis. If he tried manipulating a heavy object he felt a strain at the wrist. Thumb paralysis persisted, and extension of metacarpo-phalangeal joint of index was not so complete as in the left hand. Numbness was present down the radial side of second metacarpal and index, and more slightly on adjacent side of thumb and first metacarpal.

The points illustrated by the case were: (1) the diagnosis of the precise cause of paralysis was not made out before operation; (2) the slow recovery of power; (3) the persistence at present date of implication of deep extensors.

Mr. ALEXANDER MILLER discussed

Lesions of the Hip and their Treatment

showing lantern slides illustrating the primary and secondary deformities encountered from lesions in this region. He said that diagnosis was only established in doubtful or early cases by careful observation and follow up. The classification adopted was: (*a*) toxic arthritis, (*b*) tuberculous disease, (*c*) infective arthritis (non-tuberculous), (*d*) pseudo-coxalgia, (*e*) traumatic, (*f*) flail hip. The term toxic arthritis was reserved for cases manifesting the hip-joint syndrome which cleared up completely following rest and extension. In treatment the relative values of manipulation, extra- and intra-articular arthrodesis, and osteotomy were considered.

Mr. G. T. MOWAT spoke on

Rapid Histology in Diagnosis

He discussed cases in which errors of diagnosis as to malignancy had been made at the time of operation; in some cases radical procedure had been carried out and subsequently proved to be unnecessary, in others malignant tissue had been cut into, and an interval had been allowed to elapse while a paraffin section was being made, before adequate treatment was carried out. The results obtained in the Glasgow Royal Cancer Hospital from a system of quick histology were described. In most cases definite information was given, and in others an intelligent lead was given to the surgeon. Routine paraffin sections were made afterwards and in no case had the diagnosis as to malignancy to be revised. The system was found most useful in doubtful breast cases, but was also used in the gastro-intestinal tract and the oropharynx. In suspected carcinoma of the body of the uterus, curettage scrapings were successfully used for diagnosis. Methods used were particularly (1) the frozen section, (2) Dudgeon and Patrick method, and (3) the Ultropak illuminator. The average time taken for diagnosis was five minutes. The results left little doubt of the general efficiency of the methods, or of the practical help given to the surgeon.

Basal Metabolism in Hyperthyroidism

Dr. A. B. ANDERSON discussed the relationship of the basal metabolism rate (B.M.R.) to the clinical signs of hyperthyroidism. In a series of 140 cases of varied ages and both sexes which were clinically hyperthyroid or suspected of hyperthyroidism, the B.M.R. was estimated and compared with the occurrence of clinical signs: enlargement of the thyroid, exophthalmos, tremor, tachycardia, sweating, and loss of weight. The tentative conclusions reached were that when enlargement of the thyroid is accompanied by exophthalmos and any other of the clinical signs the B.M.R. will be high in nearly all cases. When enlargement of the thyroid is not accompanied by exophthalmos but all the other signs are present, the B.M.R. will be high in nearly all cases, but when only two or three signs are present the B.M.R. will be normal in a number of cases. When enlargement of the thyroid is present alone or with only one other sign the B.M.R. will be normal. In tachycardias without enlargement of the thyroid the B.M.R. will be normal in nearly all cases.

WATERLOO HOSPITAL FOR CHILDREN.—At the annual meeting of governors of this hospital it was stated that if a traffic roundabout was made at the junction of Waterloo-road, Stamford-street, and York-road, part or the whole of the hospital site would have to be used. The hospital has a surplus on the year's workings of over £5000 mainly owing to an increase in legacies.

REVIEWS AND NOTICES OF BOOKS

Ions in Solution

By R. W. GURNEY, M.A., Ph.D., Research Associate in the University of Bristol. London: Cambridge University Press. 1936. Pp. 203. 10*s*. 6*d*.

THE development of the quantum mechanical theory of the atom has led to important work on the nature and reactions of ions in solution. Dr. Gurney summarises, in condensed yet intelligible form, the fruits of this work. If the book gives an impression of being largely speculative, it must be remembered that the approach is comparatively new and that experimental research directly related to this approach is at present little developed. It is unfortunate, however, that the author has not taken more advantage of the frequent opportunities offered to relate his point of view to more old-established if by now more barren ones. For example, the non-existence in solution of certain metals, such as calcium, in a lower state of ionisation (Ca+) than the normal (Ca++), despite the predominance of the lower states in ionised vapours, is one of the interesting problems here raised. Dr. Gurney's explanation in terms of the ionisation energies of the solvated ions and of the solvent is no doubt sound, but it is not very helpful to dismiss as "irrelevant" the non-existence of salts in which calcium is monovalent. In nearly all cases where a metal exists in more than one state of ionisation in solution, corresponding crystalline salts are known, and rarely is a metal found in a crystal (even an anhydrous crystal) in a state of ionisation which is not realisable in solution. On the other hand, the discussion of the Debye-Hückel theory, though so brief as to be not entirely accurate, is far better balanced than many much fuller discussions which extend the theory in some particular direction while leaving its basis approximations unexamined.

The biggest recent advance dealt with is in that part of electrochemistry which thermodynamics cannot reach. The standard electrode potentials and oxidation-reduction potentials of metals are discussed in relation to thermionic work functions and energies of solvation. To the worker in the biological and medical sciences, whose interest in ions is mainly in their permeability to membranes, and their influence on colloidal dispersion and on ionisation of weak acid groups in complex molecules, the book is of no immediate practical value, because quantum mechanics has as yet little to say on these problems.

Morphologische Pathologie

By Prof. Dr. WERNER HUECK, Director of the Pathological Institute of Leipzig University. Leipzig: Georg Thieme. 1937. Pp. 818. R.M.52.

Prof. Hueck breaks away from tradition in the arrangement of subject matter. There have been truants before among text-books in pathology; for example, MacCallum's work is based on the idea that all pathological changes are the result of some form of injury; this attitude brings with it a liability to teleological thinking. Prof. Hueck, being a strict causalist, has taken the opposite point of view. He discusses the whole of general pathology on a purely morphological basis, and in fact the book may be regarded as a continuation of Oertel's "Introduction to Pathology." It is interesting to find so many problems approached from a logical standpoint instead of from one which elevates heuristic ideas to the level of final explanations.

The book is in two parts: the first, on general principles, gives an admirable account of the potentialities for differentiation of the mesenchyme and its relation to pathology, and excellent chapters on stone formation and tissue regeneration. The section on tumour formation is noteworthy for its comparison between the connective tissue tumours and normal mesenchymal histogenesis; the absence of any adequate account of the systematised blastomata is disappointing. The second part of the book deals with "related morphological pathology," which is almost the same thing as what is usually known as "special pathology"; no attempt is made to mention lesions in every organ, but a few of the more important disease processes are discussed in detail. For example, the account of pulmonary tuberculosis in its various forms, together with its complications—tuberculous enteritis, miliary tuberculosis, and amyloidosis—is excellent; other sections worthy of comment are those on disease of the heart and arteries, the stomach, and the liver. This latter section reveals an interesting contrast between German and Anglo-American teaching. Prof. Hueck accepts without question the evolution of a subacute hepatitis into a chronic stage, yet in nephritis there is no suggestion that an acute nephritis may pass through a subacute œdematous stage before the final uræmic state; "nephrosis" and nephritis are kept distinct, and focal nephritis is not mentioned.

A new book of such a revolutionary nature—perhaps revivalistic would describe better a return to the best teachings of "cellular pathology"—is unlikely to maintain throughout a proper balance in the allocation of space or to avoid omission of relevant facts. Here endocarditis is merely classed as simple, verrucous, ulceropolypous, or fibrous with little consideration of ætiological factors; the account of endocrine dysfunction in relation to constitutional morphology is too short, and the chapter on leukosis and anæmia is below the standard of the rest of this stimulating book. We commend the instructive diagrams, drawings, and photographs, and the lavish use of colour printing.

Venereal Disease

Practical Methods in Diagnosis and Treatment. Third edition. By DAVID LEES, D.S.O., M.B., D.P.H., F.R.C.S., F.R.C.P. Edin., F.R.S.E. Edited and revised by ROBERT LEES, M.B., F.R.C.P. Edin., Assistant M.O. for V.D. to Edinburgh Royal Infirmary and Edinburgh Corporation. Edinburgh: E. and S. Livingstone. 1937. Pp. 608. 15*s*.

THIS good text-book on venereal disease has now been brought up to date without having been enlarged. The sections which deal with the clinical manifestations of syphilis contain many excellent photographs, including some in colour, which are likely to be of great value to those who seldom have access to this type of clinical material. The views expressed on treatment and on standards of cure are in the main orthodox and are set out in a clear and practical way. The detailed statement of recommendations for treatment in all stages of syphilis are especially to be commended. There are two unexpected omissions. The important condition of metastatic iritis

secondary to gonococcal infection is barely mentioned, and we can find no reference to trichomonas vaginitis in connexion with the differential diagnosis of vaginal discharges of inflammatory origin. On most other subjects the information given is full and complete.

It is unfortunate that some of the methods of expression are slipshod and ungrammatical. More careful proof-reading would have excluded such lesser sources of irritation as "prostrate gland." These faults should not be allowed to obscure the value of this comprehensive work in which sound theoretical knowledge and wide practical experience are combined.

La vésicule biliaire et ses voies d'excrétion

Second edition. By M. CHIRAY, Professeur agrégé à la Faculté de Médecine de Paris; and I. PAVEL, Maître de Conférences à la Faculté de Médecine de Bucarest. Paris: Masson et Cie. 1936. Pp. 860. Frs.120.

IT is ten years since this standard text-book on diseases of the gall-bladder appeared, and the second edition necessarily contains important changes. These concern particularly the physiology of the gall-bladder and the mechanism of Oddi's sphincter, the ætiology of gall-stones, the mechanism of hepatic colic, and the bacteriology of cholecystitis. For the chapter dealing with the radiology of the gall-bladder Dr. A. Lomon is responsible, and the reader will find therein an excellent series of illustrations. A considerable bibliography enriches each chapter, and there is a full index of authorities as well as of subjects.

Studies in Cardiovascular Regulation

Lane Medical Lectures. By G. V. ANREP, M.D., D.Sc., F.R.S., Professor of Physiology, Medical Faculty, Egyptian University, Cairo. London: Humphrey Milford, Oxford University Press. 1936. Pp. 118. 10*s.* 6*d.*

IN this monograph Prof. Anrep clearly describes the many important advances recently made in our knowledge of the way in which the heart exactly adapts itself to the work demanded of it; of the respiratory influence on the heart-rate; and of the coronary blood flow. In a final chapter the blood flow through skeletal and plain muscle is shown to undergo during muscular contraction changes similar to those in the coronary flow during the cardiac cycle. Far from being the master of the circulation, the heart is to-day regarded as its highly efficient servant, its rate and output being dictated by a variety of reflexes, the receptors of which are situated in the walls of the cardiovascular system itself. Prof. Anrep gives an interesting account of how, after much controversy, the carotid sinus was recognised as an important agent in the control of blood pressure and heart-rate. With the aortic, and probably also the left ventricular wall and the carotid body, the carotid sinus forms the chief vaso-sensory area on the arterial side. On the venous side, in the auricles and right ventricle, are receptors which are held to have exactly opposite effects. The complex effects of the impulses from lung tissue and of central discharges from the respiratory centre on the cardiac rhythm are discussed in detail. Their bearing on clinical problems is not yet clear. The sections on the coronary blood flow deal not only with matters of importance to the physiologist, such as the effect of systole on the flow, but also many which directly concern the clinician and cardiologist; for example the rich dual innervation of the coronaries, the reflex constriction which occurs in them when the carotid sinus is stimulated, the effects of certain drugs and the atypical reactions when they are sclerosed. Prof. Anrep has contributed largely to cardiovascular physiology. His Lane lectures are a record of his personal observations, including those arising from important experiments which he has been able to carry out in Egypt on the human heart obtained soon after death.

1. Practical Physiological Chemistry

For Medical Students. By G. M. WISHART, D. P. CUTHBERTSON, and J. W. CHAMBERS. Glasgow: John Smith and Son, Ltd. (26, Gibson-street, Glasgow, W.2). 1936. Pp. 125. 3*s.* 6*d.*

2. Laboratory Experiments in Physiological Chemistry

By ARTHUR K. ANDERSON, Ph.D., Professor of Physiological Chemistry, the Pennsylvania State College. London: Chapman and Hall Ltd. 1936. Pp. 234. 7*s.* 6*d.*

1. DESIGNED for use with a forty hours' course in practical biochemical work, this excellent little book is eminently suitable for this purpose, being concise and accurate. The omission of the estimations of phosphate and sulphate in urine is regrettable, and sodium hydrosulphite is preferable to ammonium sulphide as a reducing agent in the study of the blood pigments. This is an outstanding little book.

2. This may be described as the text-book interrogatory and local: interrogatory, because the reader, instead of being told what the result of an experiment should be, is questioned by the author on that very point; local, because the reader is, for example, exhorted to "obtain from the instructor, in a dry flask, the sample of vinegar to be analysed"; it is possible that in other places than those familiar to the author other customs may obtain, and the instructor not be so well provided. In explanation of the sentence (p. 46) "by means of a clean graduate add 240 c.c. of water to a beaker" it is a measuring cylinder, and not the instructor, which is to be put to use.

Physical Diagnosis

By RALPH H. MAJOR, M.D., Professor of Medicine in the University of Kansas. London: W. B. Saunders Co. 1937. Pp. 475. 21*s.*

THIS valuable text-book on physical diagnosis embodies fifteen years' experience in teaching by an enthusiast for clinical medicine. Though the personal element is essential for teaching at the bedside it can be tiresome and pedantic in print, but Prof. Major is not guilty in this way; his tone is not didactic and he makes use of all the recognised authorities and recent work with frequent quotations and extensive lists of references. His admiration for the pioneers of diagnosis leads him to quote their original descriptions in many places, but the emphasis is fortunately not on the past; full credit is given to such valuable advances as the X ray, the electrocardiogram, and the phonogram in explaining the significance and the physical basis of signs. The views expressed are on the whole in line with orthodox British teaching, though as is natural where experience depends on local observation material points of disagreement will be found; for example,

pathological findings in this country do not suggest that the diagnosis of aortic insufficiency with a Flint murmur is more often correct than that of the combined lesion with mitral stenosis. The statement that the wrist-drop in lead poisoning is due to a paralysis of the ulnar nerve is of course merely a careless error.

Though there can be few practitioners who would not find interest in this work, and no teachers of medicine who could not pick up a wrinkle or two from it, it has two disadvantages from the point of view of the student for whom it is intended. First, it is too long; aspects of disease other than physical diagnosis might well have been left out, since they could not be discussed adequately in the available space. The benefit derived from learning the signs necessary for a diagnosis of aortic stenosis for example is nullified if the student goes away with the impression that it is caused equally commonly by syphilis, arterio-sclerosis, and rheumatism. Secondly, it is important that the student should know which physical signs are nowadays regarded as significant and reliable; this is not always made sufficiently clear, and the historical emphasis may encourage the seeker after strange signs who may miss dilated and pulsating veins in the neck when bending down in search for Broadbent's sign. On the other hand the many excellent photographs, the helpful diagrams, and, above all, the impulse of Dr. Major's enthusiasm may transmit to the student the thrill which will send him to the bedside, there to look, listen, and feel for himself.

Physical Therapeutic Methods in Oto-laryngology

By ABRAHAM R. HOLLENDER, M.D., F.A.C.S., Associate in Laryngology, Rhinology, and Otology, University of Illinois College of Medicine. London: Henry Kimpton. 1937. Pp. 442. 21*s*.

Dr. Hollender has had the help of ten collaborators, but is himself responsible for the larger part of this massive work. A preliminary section deals with the physical characteristics of the various agents under discussion and the apparatus used in their production; the main part of the volume is concerned with the numerous diseases of the nose, throat, and ear in which these methods may be employed, and is followed by a few miscellaneous chapters. Among the latter is one by Chevalier L. Jackson on endoscopy, and another on hearing-aids by Prof. Horace Newhart which, although interesting, have little bearing on the subject of physical therapy. Prof. Francis Lederer has contributed to this part of the book two chapters on neoplasms; in general he favours diathermy, or electrodissection, but gives no detailed description of the various forms of tumour nor of the technique of their individual treatment. This criticism may also be applied to his references to treatment by radium and X rays, where details of application and dosage are not discussed; of laryngeal carcinoma he merely says that radium has proved to be an ineffective therapeutic agent.

It is difficult to decide what methods should be included within the term of physical therapy. From this book the galvano-cautery and all forms of spa treatment and inhalation therapy are omitted. All the methods here dealt with, except the use of radium, involve the use of electrical apparatus, and include such various procedures as ionisation, diathermy in all its forms, short-wave diathermy, infra-red and ultra-violet irradiation, and X rays. These new methods, as opposed to older forms of treatment, are advocated with a degree of enthusiasm which some will think exaggerated; notably where short-wave radiation is hailed as "perhaps the most important contribution since Roentgen's epochal discovery," where diathermy is recommended for the reduction of the inferior turbinals, and the galvano-cautery is condemned because in unskilful hands it may cause adhesions. A detailed table of contents is provided, as well as a full index. The book contains useful information on the treatment of a great variety of diseases by these methods, and will be read with interest by laryngologists.

Rural Health Practice

By HARRY S. MUSTARD, M.D., Associate Professor of Public Health Administration, Johns Hopkins University. New York: The Commonwealth Fund; London: Humphrey Milford, Oxford University Press. 1936. Pp. 603. 17*s*.

THE Local Government Act of 1929, by requiring all future appointments of medical officers of health to be on a full-time basis, has inaugurated a new type of expert in rural hygiene to whom Prof. Mustard's book will be most valuable. Such an expert should have no difficulty in separating common ground from that which represents differences between American and British practices. In the United States also part-time public medical officers, often appointed for political or charitable reasons, are now giving place to full-time experts having some security of tenure of office and therefore the time and inclination to make themselves expert in their particular branch of medicine. This is the justification for this work, which is compiled on original lines. Prof. Mustard is one of America's foremost hygienists and is almost as well known in Europe as in the States as an authority on rural hygiene—because he says he has "already made most of the mistakes which it is possible for a rural health officer to make." This book is full of sound advice and is wittily expressed.

NEW INVENTIONS

A MODIFIED RECTAL BOUGIE

THE modified Wales's rectal bougie here illustrated is designed for the purpose of dilating high strictures of the rectum. It is not safe in such a situation as the upper end of the rectum to use rigid metal dilators, or any form of dilator that cannot be passed through

the stricture under full sight. The bougie is made of soft rubber in gradually increasing sizes and can be passed through a large rectal speculum or preferably an operating sigmoidoscope. The difficulty of using soft rubber bougies in these circumstances is that they buckle up, but this bougie has a hole reaching not quite to the end into which a stylet can be passed to stiffen it, and to make it possible to guide it in the desired direction.

The bougie has been made for me by Messrs. Down Bros., Ltd., St. Thomas's-street, London, S.E.

J. P. LOCKHART-MUMMERY, F.R.C.S. Eng.
Emeritus Surgeon to St. Mark's Hospital for Diseases of the Rectum.

THE LANCET

LONDON: SATURDAY, APRIL 10, 1937

PSYCHIATRY IN VOLUNTARY HOSPITALS

As part of its rebuilding scheme St. George's Hospital hopes to equip itself with a psychiatric clinic of 50 beds. The idea of incorporating such a clinic in an undergraduate teaching hospital has such striking advantages that it is indeed remarkable that it has not received effective expression before now. Most of these hospitals now have psychiatric departments; but these are concerned mainly with out-patients. From 1923 on the governors of St. Luke's Hospital maintained for a time two small wards for acute mental cases at the Middlesex Hospital, but now in all the London teaching hospitals taken together the beds allocated to psychiatric cases add up to only about a dozen, and even of these not all are adapted to the reception of refractory or overtly psychotic cases. In the course of his training the average student has little opportunity to observe the full course of mental illness. If he is sufficiently interested to attend regularly the psychiatric out-patients' department he can see a sample of mentally abnormal patients at perhaps weekly intervals for a period of from three to six months; but this is a poor substitute for the opportunity to observe them in a bed from the moment of admission to that of discharge. The effect of the existing system is that the student obtains his impressions of psychiatry in heterogeneous ways. As he imbibes his general medicine he will learn how important is the psychological factor in physical diseases; in the department of psychological medicine he can, if he wishes, familiarise himself with the common neuroses; in the habitués and hangers-on in these departments he will make acquaintance with the chronic neurotic and will appreciate how complete can be the dependency of such persons on doctors. He will see an occasional psychotic case, referred to the department for an opinion, or retained as an out-patient if certification is not deemed necessary. But with the psychotic requiring care and control he will have very little contact except at periodic demonstrations usually held at a place far removed from the scene of his usual medical studies. Though he may be expected to have a knowledge of the psychoses sufficient to answer a few regularly set questions in the final examinations, his attitude after qualification can frequently be summed up in the view that neurotic patients are a tribulation and psychotic patients a class by themselves. Of these he retains from a course of demonstrations an impression comparable to that obtained by a visitor from a series of visits to the Zoo.

In the field of neuroses, a practitioner's reluctance or incapacity to deal with the cases that come under his care is reflected in the enormous waiting-lists of organisations such as the Institute of Medical Psychology; and in the field of the psychoses there results from the existing system a popular conviction that mental illness carries a stigma which does not attach to physical disease, and that certification is a kind of disgrace. To this attitude of mind is attributable the change of name of some well-known hospitals, for example Hanwell Hospital becomes St. Bernard's Hospital. Even if a student is specially interested in psychiatry, it is only after qualification that he will be able to obtain a comprehensive first-hand experience of the total range of mental disorder. As a part of such experience the neuroses and psychoses, between which a fundamental distinction is commonly and erroneously drawn, should be studied simultaneously. Though admirable facilities exist for such study at the Maudsley Hospital, they have not hitherto been available at the undergraduate teaching hospitals. In the Scandinavian, most north European countries, and in America the medical profession is more effectively equipped to deal with mental illness before qualification. A psychiatric clinic with beds is usually incorporated with or closely affiliated to the general hospital. The advantages of this system are felt equally by the medical profession and by the public. The student is familiarised in the clinic with the principles of diagnosis and treatment of the psychiatric cases potential or actual which he will encounter in his later life; and the interests of the able and ambitious student are directed to psychiatry in which an opportunity is provided of obtaining what we would call a house appointment at his teaching hospital. The specialty is benefited by obtaining recruits of good calibre and the needs of the public are well catered for.

Many years ago the late Dr. JAMES COLLIER organised a course of neurological demonstrations at St. George's Hospital which, since his death, have been continued at fortnightly intervals by Dr. ANTONY FEILING. These are not confined to students of the hospital; indeed they have been attended by large audiences from outside. For some months psychiatric demonstrations have alternated with the sessions devoted to neurology and have been conducted by Dr. DESMOND CURRAN, with the generous assistance of the senior staff of the Maudsley Hospital. It is a wise plan to provide a nucleus round which the department can expand when facilities are available and to familiarise local doctors with the idea that expert consultants are to hand. We wish the scheme every success and will watch its development with interest. And it may be noted with gratification that an anonymous gift of £5000 has already been received towards the cost and equipment of the department.

INFECTION THROUGH THE OLFACTORY MUCOSA

IT has lately been shown in America that susceptibility to infection with certain viruses can be reduced or abolished by treatment of the

olfactory mucosa with solutions of tannic acid, alum, or picric acid. It has been suggested that this means might be of use in the prophylaxis of poliomyelitis and possibly also of other infections that gain entrance by the nose. In this connexion it is useful to have a report by Dr. GEOFFREY RAKE[1] from the Rockefeller Institute. His object was to learn how micro-organisms gained the tissues when deposited on the olfactory mucosa and to this end he first studied the absorption of prussian blue administered to mice intranasally. The method is not a new one, having been used for a somewhat similar purpose by CLARK and also by OLITSKY and COX, and like them, RAKE found that the absorption of the particles of dye was extremely rapid. Within two minutes it was seen in the lymphatics and blood-vessels of the olfactory submucosa and had reached the subarachnoid space. Apparently the pigment was absorbed by more than one route. Some of it passed inwards between the cells of the olfactory mucosa, but the larger part was taken up by the olfactory nerve-cells, from there to be dispersed again to the surrounding tissues. This was clearly brought out by experiments in which the mice had been given a preliminary intranasal application of 0·8 per cent. tannic acid, for in these animals, although the dye reached the subarachnoid space just as rapidly though in less amount, the olfactory nerve-cells were almost devoid of prussian blue. RAKE noted also in these treated mice that, although they showed no nasal discharge during life, when they were killed and examined a thick exudate of mucus and leucocytes covered the olfactory mucosa and turbinates and histological sections revealed obvious signs of inflammation. Experiments with bacteria—the pneumococcus and *Bacillus enteriditis*—showed that both these pathogens reached the brain as rapidly as the pigment, but that, unlike pigment, they travelled between the cells and not via the neurones. This observation explains previous work[2] showing that intranasal administration of tannic acid to mice confers no protection against pneumococci given by the same route. In the case of viruses RAKE found that a pantropic virus like that of equine encephalomyelitis reached the brain just as quickly as did pigment or bacteria, whereas strict neurotropes like the viruses of St. Louis encephalitis, louping-ill, and rabies took 24 hours to do so. Presumably all four viruses were taken up by the olfactory nerve-cells but the strictly neurotropic ones were held there and passed slowly inwards to the brain, whereas the pantropic equine encephalomyelitis virus, like pigment, left the olfactory neurones and travelled to the brain by the more rapid routes represented by the tissue spaces and lymphatics.

The practical lesson of this work seems to be that treatment of the olfactory mucosa with tannic acid or similar preparations is likely to be most effective against a strictly neurotropic virus and ineffective against bacterial invasion. It also sounds a note of warning in that a very definite inflammatory response resulted in the mouse from the nasal instillation of tannic acid. This would make one hesitate to advocate such a procedure in man; for repeated applications of these preparations are required to give protection and the risk of producing chronic change resulting in an atrophic rhinitis cannot be excluded.

[1] Rake, G. W. (1937) *J. exp. Med.* **65**, 303.
[2] Cox, H., and Rake (1936) *Proc. Soc. exp. Biol., N.Y.* **34**, 716.

VOX POPULI

THE People's League of Health, having made its voice effectively heard for many years in support of several good causes, has decided to add to their number. It was in 1917 that Miss OLGA NETHERSOLE founded the League, and its achievements were indicated at a luncheon recently given in her honour[1] when Lord LEVERHULME foreshadowed an appeal to be launched at the Guildhall on Thursday of next week at which the Lord Mayor of London will preside. The essential purpose of the League has been the collection and distribution of knowledge—knowledge based on scientific foundation and presented in attractive form. The Safe Milk campaign, with its inquiry as to the best means of eliminating tuberculosis from milk-yielding cows and as to the value of milk as food for school-children, is the best known of the League's activities, but the League has been invited to draw up a memorandum on the composition and description of foods, and it has initiated a study of maternal mortality and morbidity in coöperation with nine metropolitan hospitals. The League, while proposing to continue these campaigns and its activities as a bureau of health information, is now propounding eight other subjects in its new programme.

It has in prospect a centre for the practical demonstrations of a scheme for the eradication of tuberculosis from dairy herds. It proposes to develop a central almoner service where information can be obtained about everything like child welfare clinics, nurseries of various kinds, or the adoption and boarding-out of children. It intends to examine the conditions under which infants and older children are received by foster-mothers. It contemplates a survey of children under treatment at orthopædic hospitals and other institutions where surgical tuberculosis is treated. It hopes to press upon the Government the value of compulsory periodical medical and dental examinations of all persons insured under the National Health Acts. The position of the expectant mother under these Acts is to be made the subject of inquiry. The League has already emphasised the psychological aspect of unemployment and considers the time has come when no person should have scars left on his mental and physical health simply as a result of being unemployed. Finally the League will continue to study all proposals, legislative and otherwise, relating to the health of the people and the circulation of information designed to promote it. The appeal for £50,000 now being made should meet with a ready response in view of the League's past record and present intention.

[1] See *Lancet*, Feb. 6th, p. 362.

ANNOTATIONS

A QUESTION OF NEIGHBOURLINESS

MANCHESTER is learning afresh the precept that almsdoers should not let their left hand know what their right hand doeth. One form of public benevolence is the relief of pain and sickness by hospitals; another is the relief of unemployment by labour exchanges. Manchester has a Royal Infirmary with a central branch where two eminent honorary surgeons and a resident staff do their best for very serious cases to the number of 1300 to 1400 per annum. The Minister of Labour, in spite of protests, has begun to erect alongside this central branch a large building which will deprive the patients of light and air, will cause the wards to be overlooked from scores of windows, and will collect in a narrow space at close range a crowd of possibly 300 unemployed, not always perhaps the most quiet and orderly of gatherings. The Minister is doubtless not his own master. He wants to find a home for the divisional office for the North-West of England, the Central Employment Exchange for Manchester, and other departmental offices. His Majesty's Office of Works owns an empty space, bought soon after the war, adjoining the central branch of the infirmary. Naturally the Minister of Labour wants the best site; naturally the Office of Works has it available already. Between them they can tell the Royal Infirmary that its patients have been lucky all these years to look out upon a vacant space, and that, whereas the central branch is inconveniently situated and may some day have to move, the new employment exchange will be a permanent adornment of the city. What the Minister of Health thinks of the dwarfing and obstructing of the Royal Infirmary we have not been told. What the medical board and the local medical officer of health think about it we know. The Minister of Labour has been assured on good authority that his building will make the central branch unsuitable for in-patient accommodation and gloomy and depressing for a casualty department. He has been asked either to alter his building or to put it somewhere else or to take over the Royal Infirmary's building and help the trustees to replace the 54 beds which in that event would be lost. He replies that he has considered all alternatives and has rejected them; he cannot wait any longer; the building must begin.

The dwellers in a peaceful part of the Thames Valley lately learnt that a munition factory was to be established in their midst. They protested successfully; the department concerned gave way at the eleventh hour in spite of having repeatedly stated that no other place would do. Manchester has been less lucky. The Minister of Labour could not change his mind. Four years ago, with the obvious sympathy of the Ministry of Health, Parliament passed an Act to aid the fortunes of the Royal Infirmary. To-day another Ministry, insisting firmly on its legal rights, takes a step which will have the opposite effect. The trustees of the hospital have put forward a reasonable argument. The infirmary and the employment exchange, they say, are alike public services paid for out of public money. If the expenditure of the infirmary is not met from one set of pockets, it must be met from another. If the infirmary had in fact been the home of a Government department conducting important research in health matters, the Minister of Labour would have refrained from neutralising its usefulness. If he now finds himself destroying the value of Manchester's only central hospital, ought he not either to hold his hand and change his plans or else help it to find proper accommodation elsewhere?

ANÆMIA AND THE PITUITARY

THE production of acute ulceration of the acid-secreting area of the stomach of rabbits by injection of massive doses of a posterior pituitary extract was first described by Dodds and his collaborators [1] in 1934. In a further communication [2] they discussed the influence of large doses of pituitary extract on the blood and suggested that the macrocytic anæmia it induces may be due to increased blood destruction and consequent regeneration, their findings leading them to postulate a hormonal connexion between the pituitary, the gastric function, and the blood. On the assumption that the anæmia may be due to blood dilution from the antidiuretic action of the pituitary, Gilman and Goodman [3] have studied the blood changes in rabbits resulting from large doses of the extract. They find that much dilution does in fact occur—the hæmoglobin, the number of red cells, and the plasma osmotic pressure being all reduced—while cell destruction is sometimes superimposed upon it. The macrocytic anæmia was similar to that described by Dodds, but they attribute it to the altered environment of the cells during plasma dilution making them more fragile. In the test-tube, the red-cell fragility was actually reduced by lowering the plasma osmotic pressure, yet in-vivo cell destruction was increased. All these changes could be prevented by dehydrating the animals before injection of the pituitary extract. McFarlane and McPhail [4] have also produced anæmia by injections of pituitrin into normal and hypophysectomised guinea-pigs, but they did not investigate the anæmia further. They state that they have failed to find any hormonal connexion between the pituitary, the gastric function, and blood formation.

PHYSICAL EFFICIENCY AND FATIGUE

As food is the ultimate source of energy it is not remarkable that belief is perennial in the capacity of this, that, or the other comestible to postpone fatigue or increase muscular efficiency. Ever since men have undertaken the special preparation comprehended as training, the part played by diet has received exaggerated importance; and although only certain old-time restrictions now survive as a concession to tradition, the belief persists to this day that energy, stamina, strength, and endurance are directly obtainable from selected foodstuffs. The menu of any great athlete is minutely examined and as minutely followed by ambitious youngsters, and the more bizarre and heterodox the régime the greater the appeal. The success of crews in the Boat Race has on occasion been attributed to their "training on eggs"; oranges have likewise required a headline. Two years ago a professor of medicine assigned to sugar in the training dietary the credit of the repeated victories of Cambridge oarsmen. In the circumstances it is surprising that nobody accused the cunning Cantabs of having cornered all the glucose

[1] Dodds, E. C., Noble, R. L., and Smith, E. H. (1934) *Lancet*, **2**, 918.
— Hills, G. M., Noble, R. L., and Williams, P. C. (1935) *Ibid*, **1**, 1099.
[3] Gilman, A., and Goodman, L. (1937) *Amer. J. Physiol.* **118**, 241.
[4] McFarlane, W. D., and McPhail, M. K. (1937) *Amer. J. med. Sci.* **193**, 385.

in the country, so depriving the famous Oxford marmalade of the little bit extra which might have meant so much to those who endeavoured to uphold the prestige of the University upon the Isis. The latent possibilities in drugs, the mystery and the magic, naturally invite still greater expectations from such extremes as the simplest kitchen ingredients and the most obscure secrets of native witch doctors. At a recent meeting of the Berlin Medical Society Prof. Helmut Dennig, director of the Moabit medical clinic, claimed [1] an increase of physical capacity and endurance by 30 to 100 per cent. from the administration of natron, being bicarbonate of soda, to hasten the elimination of acids, especially lactic acid. The simplicity of the method recalls the remarkable effect of delaying fatigue ascribed [2] to acid sodium phosphate during the late war when this salt was administered to the German storm-troops. Investigations undertaken in America [3] failed to confirm the claim. Any advantage derived from the phosphate was due to the increased sense of well-being or the lessening of tiredness created by its stimulant action on the intestinal tract; there was no measurable increase of muscular efficiency, nor was the onset of fatigue delayed. And this was confirmed by the personal experience of a well-known physician-athlete in this country. It is common experience that in moments of stress the physical capability may be increased to an extent hitherto unexpected and almost unbelievable. In everyday life there are inhibitions which, acting like a governor, prevent a maximal effort being put forth; any drug which can diminish sensitiveness, paralyse the appreciation of fatigue, and eliminate the faculties of judgment and self-preservation might have the effect described as doping in the case of race-horses. On the continent it seems to have been necessary to issue a warning to athletes not to dope themselves.

DRAINAGE OF THE PERITONEAL CAVITY

THERE is something to be said for J. E. Jennings's contention [4] that so-called drainage of the abdominal cavity is usually "superstitious and ineffective packing." It is well established that none of the ordinary methods gives anything approaching general peritoneal drainage, but how far is this fact recognised in practice? Discussing Dr. Jennings's paper, Dr. W. B. Parsons of New York said that five surgeons suddenly confronted with the problem might be expected to give five different opinions about the right way to drain an appendix or gall-bladder, and as to why a drain is wanted in one case and not in another. Since localised drainage is alone possible, the indications for insertion of a drain are definitely restricted. The most obvious benefit to be gained is the formation of a "path of least resistance" for localised infection, actual or anticipated. Jennings holds that tubes or gauze strips—the materials usually employed—irritate the tissues, producing an exudate which at the same time tends to block the drain and encourage walling-off of the infection. Most drains act partly as packs, and unless the infective process is localised, their value as drains will be nil. In his opinion the indications for localised peritoneal drainage are, broadly speaking, two. In the first place, drains may be inserted at the end of operation to remove exudate, blood, or bile collecting at the operation site, or to serve as sentinels where a leak is feared at a line of suture in a hollow organ. Secondly, they may be used to remove infected exudate, such as pus, in cases of localised peritonitis. Here the amount of drainage that actually takes place through the tube or gauze is slight, and the important effect of the drain is that a track is made down to an "extra-peritonealised" cavity. The use of a material with the minimum of irritation to the tissues will reduce or prevent the formation of localising adhesions, and such a material Jennings claims to have found in raffia. Selected strands are chosen, cleared of strangling fibres, washed in boiling soap and water, cut into standard lengths, knotted in hanks of twenty strands, and wrapped in muslin packages. Sterilisation is carried out on three successive days, and the required strands are reboiled just before use. Raffia has a capillary action and is very strong; it is also smooth and inflicts the minimum of injury during removal. Jennings has employed it for twenty years and has found it especially useful where a drain is required simply to remove an exudate, and where no advantage can result from its acting as a pack.

VITAMIN-B DEFICIENCY AND THE HEART

HEART failure resulting from vitamin-B deficiency has long been known in the East as an accompaniment of beriberi and pellagra. An early view was that, like the neurological symptoms, the heart affection was secondary to a neuritis, the vagus nerves being the site of the lesions. When in 1927 Wenckebach discussed this subject in our columns,[1] he suggested that the functional failure of the beriberi heart was due to œdema of the myocardium. Weiss and Wilkins [2] have now come to the conclusion that similar deficiency states, accompanied by cardiac disease, are not uncommon in the United States; and they have been able to collect 97 cases, 12 of which they observed personally. As evidence of vitamin-deficiency they accepted polyneuritis, pellagroid dermatitis, glossitis, and gastro-intestinal disturbances, and a history of an inadequate diet. The heart lesions associated with these conditions could not be put down to other recognised factors, and the symptoms and signs of such lesions improved after administration of vitamin B. The circulatory symptoms were variable; but prominent among them were dyspnœa, regular tachycardia, palpitation, and exhaustion. These, with excessive arterial pulsation, loud sounds over the arteries, and a rapid circulation-rate, are features that recall the circulatory changes in goitre and also in some functional nervous disorders. Such symptoms were found especially in association with polyneuritis. Syncopal attacks, exaggerated sensitivity of the carotid sinus, vasomotor collapse, and brachycardia in convalescence were also observed and were regarded as signs of nerve lesions. On the other hand, some of the symptoms often encountered are more characteristic of hypertensive and ischæmic heart disease—for example, gallop rhythm and congestive failure with normal rhythm. Cardiac enlargement was usual and changes in the electrocardiogram were rarely absent; these included low voltage, altered T waves, premature beats, and occasionally auricular fibrillation. Histological studies on a few cases that came to autopsy showed myocardial changes like those described by Wenckebach, but these are held by Weiss and Wilkins to be in no way specific. The treatment of these cases is simple enough, consisting in rest and

[1] *Belfast Telegraph*, March 18th, 1937.
[2] Emden Schmitz and Meinicke (1921) *Hoppe-Seyl. Z.* **113**, 10.
[3] *Publ. Hlth Rep., Wash.* 1926, **29**.
[4] *Ann. Surg.* January, 1937, p. 67.

[1] Wenckebach, K. F. (1928) *Lancet*, **2**, 265.
[2] Weiss, S., and Wilkins, R. W. (1936) *Trans. Ass. Amer. Phys.* **51**, 341.

administration of vitamin B—if necessary giving the crystalline B_1 by injection. Improvement was striking, signs of congestion, for example, disappearing far more rapidly than might be expected in other forms of congestive failure; the electrocardiogram also quickly regained its normal form. In animal experiments such effects are even more remarkable, gross electrocardiographic changes seen in rats suffering from vitamin-B_1 deficiency could be abolished within twelve hours by an injection of crystalline B_1 (Zoll and Weiss [3]).

This paper by Weiss and Wilkins is of great interest, and the six cases they record in detail would be hard to explain in ordinary ways—except perhaps one, in which the patient appears to have had hypertension. Five of these six patients had alcoholic polyneuritis, now regarded as directly due to lack of vitamin B_1, and it is possible that inquiry into such cases in this country, though now of course relatively rare, might reveal significant cardiovascular disturbances.

JUDGMENT AND REASON

Dr. Hutchison's little trilogy on the fundamental principles of clinical medicine [4] has reached us in its second edition. For the rounded felicity of their style and the practical wisdom of their content his essays are well worth re-reading. The preface puts words into the reviewer's mouth: "although there is nothing in them that has not been said often before, there is also nothing in them that will not bear saying again." In the essay on diagnosis, we read that this art involves the use of observation, of knowledge, and of judgment, and by judgment is meant an intuitive faculty of distinguishing the relative importance of things. The use of reason is not mentioned, which is a little discouraging for those who labour in the faith that scientific methods and scientific ways of thinking have much to contribute to medicine. Not the most ardent of them, however, can deny that medicine, as she is practised, is still largely empirical. And there is certainly the danger, which Dr. Hutchison would guard against, that the art of dealing wisely with the sick may be perverted by pseudo-scientific enthusiasms. Most of us would be the better for turning over these pages again, and a copy would not come amiss as a gift for some medical student of our acquaintance who may be approaching his final examination.

URETERO-INTESTINAL IMPLANTATION

EIGHTY years have elapsed since Simon made the first attempt to divert the urine into the bowel, and during these eighty years more than a thousand such operations have been performed. Hinman and Weyrauch,[5] who have written an elaborate account of the methods used, complain that previous reviewers have laid too little stress on the surgical principles on which a satisfactory operation must be based. An historical review can be of use to the surgeon of to-day only if it teaches the way to implant ureters more successfully than has been done in the past. The conclusions Hinman and Weyrauch themselves reach are not altogether optimistic. They are left "with a feeling of disappointment at the lack of improvement with the advent of newer methods and greater experience. It would seem that every surgical technique imaginable has been tried." Of the eleven methods listed, submucous implantation has given the best results; yet many questions about it still require answers. What are the factors that produce localised necrosis of the intestine or perforation and tearing-out of sutures? Why is anæmia, infarction, extensive necrosis, diffuse ureteritis, or dilatation of the ureter found at autopsy? Too often the answer to this will be failure on the part of the operator to obey the simple well-known rules of intestinal and ureteral surgery. The only layers that are safe for suturing are the submucous layer of the bowel and the adventitia of the ureter. Sutures cannot penetrate the lumen of either without danger. Their blood-supply cannot be disturbed to any great extent; neither can they be unduly bruised, twisted, or displaced. These are some of the principles that must be followed if postoperative accidents and complications are to be reduced. Besides these problems of technique there are others needing consideration, such as urinary sepsis. Sometimes varying degrees of pyelonephritis, or infected hydronephrosis, are present before operation, and experience shows that such conditions are often favourable rather than otherwise, because they favour immunity. The surgeon must needs consider not only his surgery but the possibility of raising the patient's resistance to it.

RESPIRATORY EFFICIENCY

WORKERS in many centres continue the search for an easy way of expressing the degree of efficiency or failure of the respiratory apparatus. Kaltreider and McCann [1] report investigations on patients with chronic pulmonary disease, comprising estimates of the ventilation, respiratory rate, tidal volume, oxygen consumption, and carbon-dioxide production during a standard form of exercise in 20 normal subjects and in 28 patients with cardiorespiratory abnormalities. They also correlated their results with blood examinations and certain measurements of the chest. From these they conclude that the amount of dyspnœa is proportional to the expression $\frac{\text{total ventilation}}{\text{vital capacity}}$. They find that dyspnœa is experienced when this value is greater than 51, and that excess of this figure at low levels of work is an indication of pathological dyspnœa. The maximum minute-ventilation that can be maintained for 1½ minutes is only roughly proportional to the vital capacity in normal subjects, but in chronic pulmonary disease the relation is closer. In their examination of other suggested tests for respiratory efficiency, Kaltreider and McCann make certain valuable criticisms, as for example, that the "ventilation equivalent for oxygen" (the amount of ventilation required per 100 c.cm. of oxygen absorbed) suggested by Knipping, Lewis, and Moncrieff is not a good index of the degree of dyspnœa since it varies from person to person. The pulmonary reserve on the other hand is held to be a useful measure of the tendency to dyspnœa. Normal subjects can increase their resting minute-volume about ninefold, but patients disabled by pulmonary fibrosis and emphysema could often increase their ventilation only to about 60 per cent. of the maximum minute-ventilation on moderate exertion. The basis of the investigations has been the results obtained with subjects harnessed to a closed spirometer, and in

[3] Zoll, P. M., and Weiss, S. (1936) *Proc. Soc. exp. Biol., N.Y.* **35**, 259.

[4] Principles of Diagnosis, Prognosis, and Treatment. Second edition. By Robert Hutchison, M.D., LL.D., F.R.C.P., Consulting Physician, London Hospital and Hospital for Sick Children, Great Ormond-street. Bristol: John Wright and Sons, Ltd.; London: Simpkin Marshall. Pp. 53. 3s. 6d.

[5] Hinman, F., and Weyrauch, H. M. (1936) *Trans. Amer. Ass. gen.-urin. Surg.* **29**.

[1] Kaltreider, N. L., and McCann, W. S., *J. clin. Invest.* January, 1937, p. 23.

two other papers [2] Lessen, Cournand, and Richards, offer damaging comments on certain of the measurements made of the respiratory gases in a closed-breathing circuit. They show, for example, that when a normal person breathes for several minutes in a small closed circuit in which the oxygen concentration is steadily decreasing, a state of equilibrium is reached and maintained in which the concentration of the nitrogen expired is less than that of the nitrogen inspired. This is due to the progressive increase in inspired-nitrogen concentration with each breath, to mixing of inspired air in the lungs with air previously inhaled, and to the exhalation of mixed samples. In the determination of residual air volumes by quiet breathing, in a closed-circuit apparatus, use of alveolar air samples, obtained before and at the end of the breathing period, enables a correction to be made for the inequality of concentrations of inert gases through the system. This correction may amount to several hundred cubic centimetres in normal subjects. In patients with emphysema, with a poor distribution of tidal air and hypoventilation through a large part of the pulmonary air spaces, the errors may be even greater if the residual lung volumes are determined by methods of quiet breathing in a closed circuit. This fallacy of what these authors call "nitrogen lag" is one demanding serious attention, since it may well prove to be one of the reasons why similar, but not exactly the same, spirometric experiments in different centres seem to give widely different results.

TUMOURS OF THE HAND

THE swellings other than acute infections that may arise in the hand are discussed by M. L. Mason [3] (Chicago) with reference to origin and prognosis after removal. Ganglia he regards as being probably due to a gelatinous degeneration in the fibrous sheaths of the tendons or joint capsules, and not to synovial herniation as was previously held. Epidermoid cysts are attributed for the most part to implantation of epithelial cells, while a few may develop from congenital inclusions. Xanthoma is a tumour peculiar to the extremities, whose origin is not settled. It occurs as a firm slowly growing nodular mass, most often on the volar surface of the thumb or finger. The tumour is made up of lobules of yellow, orange, brown, and grey tissue, bound together by septa, and surrounded by a thin capsule. Microscopically it is seen to be composed of giant cells, large round cells, spindle cells, and foamy cells; it does not recur after complete removal. Fibromas and lipomas in the hand behave as they do elsewhere in the body. An interesting tumour is a telangiectatic granuloma, which follows infection in an abrasion. It bleeds freely, and recurs if not completely excised. Subungual melanoma and carcinoma are described, likewise carcinoma arising in an irritative lesion, as after burns, thermal and radiological, or chemical irritants. The prognosis of these is bad. Chondromata are common in the metarcarpals and phalanges. Angiomata of various types occur in the hand. A tumour of recent recognition is called a glomus tumour, arising under the nail bed, and sometimes elsewhere in the hand. It is said to be developed from the neuromyo-arterial glomus of Masson,[4] and is made up of blood-vessels with thickened walls, the media being replaced with epithelial cells, smooth muscle-fibres, and myelinated and unmyelinated nerve-fibres. When this tumour is removed complete it does not recur.

Such detailed studies of regional surgery provide a useful pathological background for guidance in treatment.

[2] Lassen, H. C. A., Cournand, A., and Richards, D. W., Jr., *Ibid.*, pp. 1 and 9.
[3] *Surg. Gynec. Obstet.* 1937, **64**, 129.
[4] Masson, P. (1924) *Lyon Chir.* **21**, 257.

CANCER OF THE LUNG

THE faint ray of hope that has flickered into the prognosis of carcinoma of the lung made it a suitable subject for the Silvanus Thompson lecture delivered at the British Institute of Radiology's congress last December. This lecture, which we summarised at the time, appears in full in the March issue of the *British Journal of Radiology*. The lecturer was Dr. A. C. Christie of Washington, and under the head of diagnosis he makes it very clear that earlier recognition is essential if treatment is to have a chance of success in more than a minute proportion of cases. When a patient of 40 or over complains of persistent cough with a small amount of sputum, sometimes blood-stained and accompanied by moderate dyspnœa and pain, the suspicion of carcinoma should at once be raised. Physical signs are of little value, and in reaching a diagnosis there must be careful correlation of information obtained by various means of which the most important are radiological and bronchoscopic. Once recognised, there is now a possibility of complete eradication of the growth and for this purpose total pneumonectomy is tending to take the place of lobectomy. Although it is at present applicable only in a small proportion of cases, the fact that any cures are possible should stimulate interest in early diagnosis to such an extent that these operable cases cease to be such rare exceptions. Radiation therapy has on the whole been disappointing in lung cancer, and it must be admitted that highly differentiated tumours in this region are almost completely radioresistant. With less differentiated tumours Dr. Christie considers the results more encouraging, especially when, after careful localisation of the tumour, it is irradiated through several relatively small portals.

A CONFLICT OF PHILOSOPHIES

A LITTLE book [1] written with obviously sincere moral and religious convictions attacks what have been called, and perhaps properly, the "pretentions" of science in the philosophical and moral fields. In particular it attacks, on the one hand, the crude materialism implied if not expressed in many popular biological writings, and, on the other, the somewhat patronising attitude taken towards theology in modern books of cosmology and physics. One can understand the irritation aroused by this attitude in persons of a theological turn of mind whose humanistic background stretches beyond Heisenberg and Einstein to Spinoza and Jonathan Edwards. It is not unreasonable to regard the "indeterminacy principle" as a device of the physicist to get himself out of an awkward situation of his own making. Stepping-stones have, before now, in science, been mistaken for foundation-stones. The modern philosopher-physicist might well feel some misgivings that illustrations from "Alice in Wonderland" come so glibly from his tongue. Even "free-will" theologians of the sterner sort will hardly appreciate concessions that might equally be given as an excuse

[1] The Philosophy of Religion *versus* The Philosophy of Science. An exposure of the worthlessness and absurdity of some conventional conclusions of modern science. By Albert Eagle, lecturer in mathematics in the Victoria University of Manchester. Printed for private circulation and obtainable through all booksellers from Simpkin Marshall Ltd. 1935. Pp. 352. 5*s*.

for believing in any nonsense. Mr. Eagle is a trained mathematician and physicist and as such is obviously more at home in physics than in biology, psychology, or economics. His attack on the relativity theory, though it could no doubt be parried by an expert relativitist, is at least a pungent statement of the reactions of the ordinary man to the theory. The main fault in this book is that the author attacks too much and too wildly and the reader becomes bewildered by his divagations through relativity and indeterminacy, evolution and embryology, psychology, capitalism, communism, and the rest. A philosopher must not be blamed for exercising his proper function as a critic of universal knowledge, "but it needs happy moments for this skill," and it is hardly work for the amateur. Mr. Eagle does, however, succeed in reminding us how many slip-shod philosophical notions reach the ordinary reader in the form of "asides" in popular scientific writings. This is difficult to avoid as the ordinary reader craves for general and sensational ideas and a sop must be thrown to him from time to time. How far he is misled, and how far it matters if he is, are nice problems in the ethics of popular education. He at least gets plenty of opportunity of hearing both sides of the argument, even if the argument is a bad one, and it is unlikely that Mr. H. G. Wells's fervent materialism will do him any more harm than Sir Arthur Eddington's light-hearted theology. In other respects, he will be unquestionably the better for such books as "The Science of Life" or "The Nature of the Physical World," which after all were not primarily written to teach him philosophy but to reveal to him some of the wonders of modern discovery.

A NATIONAL FOOD POLICY

IN his broadcast last week the Minister of Health described the report of the Advisory Committee on Nutrition as the most valuable document on the subject yet issued, and went on to set out the action he had already taken on it. He had, he said, that day communicated with all the maternity and child welfare authorities in the country asking them to review their arrangements for the supply of milk and other protective foods to mothers and young children. He deprecated the time-limits placed on the supply of milk to expectant mothers and young children, and suggested as a simple criterion the supply of sufficient milk or other food whenever the provision is necessary for the maintenance of the health of the mother or young child. He had asked local authorities to review the scales of income at present in force and to frame them in such a way as not to render it difficult for mothers to take advantage of the authorities' arrangements. Wherever possible the milk-supply should be efficiently pasteurised, and where this was not practicable the medical officer of health should approve the source and quality of the milk-supply. He regretted the abandonment in various places of the organised system of supplying meals because of the difficulty in securing the attendance of sufficient mothers or young children, and expressed a hope that the successful solution of the difficulty in certain large towns would be more widely followed. The new Act, raising the block grants to local authorities and redistributing the grants so as to give a larger share to authorities whose need was greatest, should, he thought, help to do away with local hesitation on grounds of financial stringency. Existing services deserved to be more widely known and he emphasised the share which the Ministry is taking in the autumn campaign to make the services better known and more fully availed of. Finally he offered to discuss with representatives or officers of the local authority any difficulties in the way of a fuller realisation of the committee's recommendations.

WHAT IS OSTEOPATHY?

OSTEOPATHY began as, and still is, an American cult. The founder of the faith, Andrew Taylor Still, was a remarkable man born in Virginia in 1828 and in 1874 the recipient, according to his own account, of a divine revelation of the true science of healing which he called osteopathy. What *is* osteopathy? Two doctors, Charles Hill and H. A. Clegg, have tried to answer this and relevant questions in a most readable book.[1] The authors are perhaps biased: they are doctors. Yet seeing that osteopathy deals with human disease, and doctors are the only class in the community who can lay claim to having studied the subject scientifically, that is no drawback and the fact that neither of the authors is engaged in medical practice ensures that their bias, if it exists, is not due to fear of direct professional rivalry. Their positions in the British Medical Association give them a broad outlook on medicine and a benevolently critical attitude towards their brethren; and in addition to a scientific training they have developed a more than usually wide knowledge of the public and legal aspects of the healing art. It is not their fault that the reader will find a certain amount of confusion when he comes to the part of the book where they try to give a description of the cult; for Hill and Clegg are in the same predicament as an artist trying to produce a picture of a versatile chameleon: the beast changes colour while you look at it. In the history of disease there has been a progressive unfolding of the truth, and even a "revolutionary" discovery in connexion with a particular disease is found sooner or later to harmonise with such earlier knowledge as existed. But osteopathy, like the chameleon, appears to change colour for protective reasons. Still believed that all disease could be ascribed to displacements of the spine, ribs, or hips. One would imagine that he would have hailed the advent of X rays with shouts of joy. Not a bit of it: no concerted attempt was made to employ the new diagnostic weapon and when it was found that osteopathic displacements could not be demonstrated radiographically, and that easily demonstrable displacements of the spine and hips did not lead to other more remote diseases as the osteopaths taught, the osteopathic "lesion" was born, something much more subtle and elusive, to replace the discredited "displacement." It is a remarkable and instructive fact that this nebulous lesion found its way recently into the august seclusion of our House of Lords. A Bill for the registration of osteopaths was introduced in 1935, and after attaining a second reading was referred to a Select Committee. Although the subsequent investigation was expensive and time consuming, the resulting exposure of the osteopaths has done nothing but good. Dr. Hill and Dr. Clegg allow the committee's report to speak for itself: it shouts condemnation. This, for example: "The only existing establishment in this country for the education and examination of osteopaths was exposed, in the course of evidence before us, as being of negligible importance, inefficient for its purpose, and above all in thoroughly dishonest hands." Throughout the book, indeed, the evidence has been

[1] What is Osteopathy? By Dr. Charles Hill, deputy medical secretary, British Medical Association; deputy Editor, *British Medical Journal*; and Dr. H. A. Clegg. London: J. M. Dent and Sons. 1937. Pp. 217. 7*s*. 6*d*.

arranged with great precision, and the whole story is told clearly and with engaging good humour.

A point remains for consideration. The fact that osteopathy reached the House of Lords was due to one thing—certain noble lords had been cured by osteopaths, where, presumably, the doctors had failed. This side of the question is examined, but one is left with the impression that manipulation of the spine (which in certain cases that drift to the osteopath cannot fail to do good) as well as of other joints is being regularly employed in suitable cases by members of the medical profession. Yet too often still one meets a patient who visited the bone-setter or the osteopath after one or more doctors had failed to relieve him, and who was cured. This is not the place to discuss the teaching of manipulative surgery (perhaps the authors considered it outside the scope of their book), but this important subject certainly has a claim to more attention from medical students than, for various reasons, it now receives.

A DIRECTORY OF LONDON MUNICIPAL HOSPITALS

THE county of London having settled down to another three years of hospital administration undisturbed by thoughts of election, it is useful to have for reference a handbook[1] prepared by its hospitals and medical services committee. This committee is responsible for 65 general and special hospitals, a small-pox receiving station, and 9 institutions containing at the present time beds for sick, healthy, and infirm inmates. The hospitals are classified as 27 general, 1 for the chronic sick, 15 infectious, 6 children's (sick and convalescent), 10 tuberculosis (including 4 for children only), 2 adult convalescent, 2 epileptic, 1 for ophthalmia neonatorum and vulvo-vaginitis in children, and 1 for maternity cases associated with venereal disease. They contain some 38,500 beds, and the handbook gives concise information about them all under six headings, including an admirable hospital map of the county. Primarily the information is for the use of the managing committees, whose names and time of meeting are set out for each hospital, but there is a much wider circle which will welcome such a conspectus of the hospitals as a whole, with precise information about access, number of beds, particular kind of work done with alterations in progress or proposed, and the names and qualifications of heads of departments. On p. 90 of the handbook is an imposing list of the special units at the L.C.C. general hospitals of which further details will be found on p. 893 of our present issue.

ROCKEFELLER TRAVELLING FELLOWSHIPS

THE Medical Research Council announce that they have been entrusted by the Rockefeller Foundation of New York with £3000 annually, for three years in the first instance, for the award of travelling fellowships in medicine to candidates in the United Kingdom. This generous benefaction renews an arrangement which had been highly successful during an earlier period, but which had latterly been interrupted during a revision of the Foundation's general policy. These Rockefeller fellowships are intended for graduates who have had some training in research work in clinical medicine or surgery or in some other branch of medical science, and are likely to profit by a period of work at a chosen centre in the United States or elsewhere abroad before taking up positions for higher teaching or research in this country. Five or six fellowships will be available annually, and applications for the academic year 1937–38 will be invited in May. It is of interest to recall an analysis which was made, at the end of the previous ten-year period, of the positions occupied by the 70 men and women who had completed their tenure of Rockefeller fellowships awarded by the Council. This showed that 12 were professors in universities, that 36 others occupied whole-time positions for teaching and research, and that a further 16 held part-time appointments of the same kind.

FOOD AND EXERCISE

MANY people little disposed to listen to discussion of the principles governing nutrition or the best means of promoting physical culture take a lively interest in talk of food and exercise. Lord Horder was wise, therefore, in using concrete example and homely simile in a survey[1] introductory to a series entitled "Towards National Health" to be broadcast on Monday evenings during April, May, and June. Proper food, decent shelter, ample fresh air, a chance of doing work, a reasonable amount of leisure, and room for play: these, Lord Horder declared, are the means of health, and governments, central and local, can see to it that no section of the community lacks them. He dismissed the man who talks about the "secrets of good health" as either a crank or one who has something to sell, and showed how easily science can be prostituted to business ends. On the other hand, health is more than a balanced resistance to stresses. It implies the possession of some kind of purpose or passion, be it a lofty one or a low one. Lord Horder's conviction of the need for fostering zest for life if health is to be maintained led him to plead for exercise without exercises, though he does not minimise the value of sergeants and instructors in correcting faults of posture or gait. Just as natural and appetising foods are better for us than artificial and doctored foods, so, he holds, natural and enjoyable forms of exercise are better for us in every way than drill and physical jerks.

Future talks will be concerned with various aspects of nutrition and on May 24th they will be linked to a second part of the series by an account of the relation of physical culture to nutrition and to other aspects of national health.

[1] *The Listener*, April 7th, 1937, p. 655.

[1] London County Council: A Handbook of General and Special Hospitals and Ancillary Services. 1936. London: P. S. King and Son. No. 3245. Pp. 168. 1s. 6d.

UNIVERSITY COLLEGE HOSPITAL, LONDON.—It was announced at the annual meeting of governors of this hospital that all the new extensions were in full working order and almost all the pay beds occupied. The centenary appeal made in 1935 for £300,000 has now reached £102,839. The number of patients is increasing and general accounts show a deficit of over £5000, which will probably be increased by the burden of interest charged in connexion with the private patients' wing. Special efforts are being made to facilitate the admission of emergency cases.

EASTBOURNE EAR, NOSE, AND THROAT HOSPITAL.—The Marquess of Hartington was elected president of this hospital at the annual meeting on March 24th, in succession to the late Sir John Maitland. Legacies and gifts strengthened the financial position during 1936, and as the number of patients was increasing year by year—306 in-patients and 2178 out-patients had been treated during the last twelve months—it was hinted that the governors were contemplating the erection of a hospital on two floors in a quieter neighbourhood.

PRINCIPLES OF MEDICAL STATISTICS

XV—GENERAL SUMMARY AND CONCLUSIONS*

IN the preceding sections I have endeavoured to make clear to the non-mathematically inclined worker some of the technique that the statistician employs in presenting and in interpreting figures. The major part of that discussion has been directed to two basic problems :—

(1) The "*significance*," or reliability in the narrow sense, of a difference which has been observed between two sets of figures—be those figures averages, measures of variability, proportions, or distributions over a series of groups ; and

(2) The *inferences* that can be drawn from a difference which we are satisfied is not likely to be due to chance.

A Secure Foundation for Argument

The discussion of the first problem led to the development of tests of "significance"—the standard errors of individual values, the standard errors of the differences between values, and the χ^2 test. The object of such tests is to prevent arguments being built up on a foundation that is insecure owing to the inevitable presence of sampling errors. Medical literature is full of instances of the neglect of this elementary precaution. Illustration is hardly necessary but I may, perhaps, give a quotation from an article published while I was preparing this section for the press : "a mere list of the treatments which have been tried in thrombo-angiitis obliterans would be of formidable length and there is little point in mentioning many of them—they have only too often fallen by the way after an introduction more optimistic than warranted by results" (*Lancet*, 1937, 1, 551). This general summary may well be written round that problem of clinical trials.

In general, worker A, who is at least careful enough to observe a control group, reports after a short series of trials that a particular method of treatment gives him a greater proportion of successes than he secures with patients not given that treatment, and that therefore this treatment should be adopted. Worker B, sceptically or enthusiastically, applies the same treatment to similar types of patients and has to report no such advantage. The application of the simple probability tests previously set out would have (or should have) convinced A that though his treatment *may* be valuable, the result that he obtained *might* quite likely have been due to chance. He would consequently have been more guarded in his conclusions and stressed the limitations of his data.

If, however, the test satisfied worker A that the difference in reaction that he observed between his two groups was *not* likely to be due to chance, then there comes the second, and usually much more difficult, problem. Were his two groups of patients really equivalent in all relevant characteristics except in their differentiation by mode of treatment ? This question immediately emphasises the importance of the initial planning of clinical trials with some new treatment or procedure, a point which was discussed in the first of these articles. The simple probability tests are *not* rules merely to be applied blindly at the end of an experiment, whether that experiment be well or badly carried out. Certainly they can tell us in either case whether certain observed results are likely or not likely to be due to chance ; equally certainly they can tell us nothing beyond that. But if the trials are well-planned then we can with reason infer that the "significant" difference observed between the groups is more likely to be due to the specific treatment than to any other factor, for such other factors are likely to be equally present in both groups in the well-planned test. If the trials are badly planned, in the sense that the groups to be compared are allowed to differ in various important respects as well as in treatment, then we can infer nothing whatever about the advantages of the specific treatment. The time to reach that very obvious conclusion is not at the end of the experiment, when time, labour, and money have been spent, but before the experiment is embarked upon. To argue at the end of a badly planned experiment that the statistical method is not applicable is not reasonable. The statistical method (like any other method) must fail if it has to be applied to faulty material ; but faulty material is often the product of a faulty experiment. Much thought, in fact, must be given to the devising of a good experiment, of really effective clinical trials, and the statistical aspect must be borne in mind from the start.

The Problems of Clinical Trials

With methods of treatment the main questions to be settled are usually these :—

(*a*) How can the patients be effectively allocated to the two groups which are to be compared—which we can refer to as the treated and control groups.

(*b*) What criterion or criteria can be used as evidence of the effects of treatment.

(*c*) On how many patients will the trials have to be made to give reliable results.

The answers to these questions will, naturally, vary with the particular case at issue, but there may be some advantage in discussing them, briefly in general.

(*a*) ALLOCATION TO GROUPS

By the allocation of patients to the two groups we want to ensure that these two groups are alike except in treatment. It was pointed out in the first section that this might be done, with reasonably large numbers, by a random division of the patients, the first being given treatment A, the second being orthodoxly treated and serving as a control, the third being given treatment A, the fourth serving as control, and so on, no departure from this rule being allowed. It was also pointed out that this method could be elaborated, the groups being made equal in such well-defined characteristics as age and sex, and then randomly composed in other respects (and, of course, more than one form of treatment could be brought in). While the treatment to be tested has only an empirical basis—as it must have before it has been adequately tried out—there can be no serious moral objection to this procedure, though practical difficulties of administration may well arise. On the other hand, once there is evidence that one treatment gives better results than another (even though the evidence is slender) the moral problem becomes acute. One cannot treat human beings like laboratory animals and to withhold from a patient a treatment which is likely to benefit him is impossible. All the more important, therefore, is it to secure reliable evidence of the effects of a form of treatment before that

* In Sections IV and X I discussed the meaning and use of the standard deviation and the coefficient of correlation. I have been asked to show how in practice these two statistical values are calculated. I propose to do this in two further sections which will follow this concluding summary.

position arises. In the early days of a new treatment there are also likely to be some workers who regard it favourably, and others who distrust it. If a random division of patients is objected to, or is administratively impossible, it should be possible at this stage to make comparisons between similar types of patients to whom worker A is giving the treatment and worker B is not. For example, in the treatment of pulmonary tuberculosis by collapse therapy there are physicians who now believe that an artificial pneumothorax should be induced at an early stage; there must have been, and no doubt still are, many patients of similar types to whom that treatment has not been applied, who would serve as an effective standard of comparison. The difficulty is that usually any one worker's field of observation is too limited to give a convincing result, while a prolonged period of observation of each patient is also a necessity and difficult to secure. Organisation is required so that patients may be classified on a uniform system, and the results collated and judged by identical criteria. In the long run it is probable that useless forms of treatment will be discarded and the good will survive, but it may be an unfortunately long run which carefully controlled trials would have effectively shortened.

The advantage of recording limited data.—Even the smallest amount of data has its advantage, if collected on some uniform system and clearly defined. In some instances it is only by the accumulation of such data that an answer to a problem can be reached. For example, there is some evidence that epidemics of milk-borne and water-borne enteric fever differ in the sex- and age-incidence of the persons attacked, the former attacking women and children—the larger consumers of milk—with proportionately greater frequency. The problem cannot be settled by the evidence from any one epidemic; it requires the accumulation of data from a series of epidemics of the two types. The field of observation of any one worker is insufficient, but if uniform data of the sex and age of patients are systematically collected and published reliable evidence will eventually be reached.

The problem of classification.—In that particular instance the criteria for classification of patients, namely, age and sex, are simple; in grouping *types* of patients, given or not given a specific form of treatment, the task may be very much more difficult. No purely objective criteria may be available and subjective factors, variable from one worker to another, may enter in—for instance in classifying patients with cancer or pulmonary tuberculosis to the stage of disease. Can any system in each case be devised which with any worker ensures that like is being put with like, at least in broad categories? It is often said that it cannot be done, that particular problems are not susceptible to statistical analysis because patients cannot be efficiently classified before and after treatment. It is true that there are sometimes very serious difficulties in making such objective classifications but these difficulties must be faced if the problem is important. Can a clear-cut answer be reached in any other way to the fundamental questions "is this treatment of value, of how great a value, and with what types of patients?" In the large majority of cases it is difficult to see how it can. Even if the treatment is not of general value but of apparently great benefit in relatively rare isolated cases, satisfactory evidence of that must lie in statistics—viz., that such recoveries (however rare) do not occur with equal frequency amongst equivalent persons not given that treatment. Sooner or later the case is invariably based upon that kind of evidence, but in the absence of planned trials it is often later rather than sooner. If it be maintained merely in general terms that a particular type of patient fares much better under such-and-such a form of treatment, then two queries arise. If the patient can be thus defined as of this particular type why cannot he be classified and compared with the patients of similar type not specifically treated? To reach the conclusion that he has benefited from treatment he must have been compared at least mentally with his untreated prototype, and the conclusion is itself based upon statistical though unrecorded evidence. The difficulty does not seem to lie, in that case, in classifying (for the clinician has done that in drawing his conclusion) but rather in the small field of observation of any one worker and in the lack of organised trials in the earlier days of a form of treatment. It may of course be said with truth that no two patients are alike in all respects; but if that is a logical objection to classifications it is equally a logical objection to treating any patient on the basis of past experience. In medical statistics, moreover, we are not usually comparing the reactions of individuals but of broadly similar groups of individuals, and in comparing randomly chosen groups, or groups representative of a type, we can reasonably presume, if the groups are fairly large, that the distribution of unknown characters which may influence the issue is likely to be equivalent.

(*b*) ASSESSMENT OF THE RESULTS OF TREATMENT

The second query that arises from our general statement is *how* much better do the patients fare under the particular form of treatment? How can the advantage be qualitatively or quantitatively assessed? For that purpose the criterion of success or failure must be defined, and clearly the more objective it can be made the better it will be. The criterion must, of course, vary with the problem. It is useless to use the survival-rate as an index with a disease that has an extremely low fatality-rate. Speed of recovery may be an appropriate test in one case, incidence of complications in another, absence of remission in a third, structural change in yet another, and so on. The choice of criterion and the way in which it is to be measured or defined are inherent in the question at issue and an essential part of the planning of the experiment, the clinical trials, or whatever is under discussion. The way in which it is to be recorded, the means of securing uniformity if different workers are involved, and the steps to be taken to avoid the omission of necessary items of information, must all enter into this plan in its initial stages. Team-work is often requisite and in that team I suggest (at the risk of being accused of over-emphasising the importance of my own subject) the medical statistician ought to be represented. His inclusion should have two advantages. He should be able to advise on the statistical aspects of the inquiry at its inception, and secondly, and equally important, he will learn at the start the details of the problem, the difficulties of solving it, and the factors that may complicate it. If his task is only to come in at the end, merely to make a technical analysis, he may be faced not only with material that is not capable of answering the questions posed but also with material which he may imperfectly understand, having had no previous association with it, and therefore be liable to misinterpret.

(*c*) THE NUMBERS REQUIRED

Finally a question very frequently put to the statistician relates to the size of the sample that is

necessary to give a reliable result. To that there is usually no simple answer. If two groups are to be compared, a treated and a control group, then the size of the sample necessary to "prove the case" must depend upon the magnitude of the difference that ensues.

If, to take a hypothetical example, the fatality-rate (or any other selected measure) is 40 per cent. in the control group and 20 per cent. in the treated group, then by the ordinary test of "significance" of the difference between two proportions, that difference would be more than is likely to occur by chance with 42 patients in each group (taking twice the standard error as the level). In other words, with those fatality-rates we should have to take at least 42 patients in each group to feel at all confident in our results. If there were 50 patients in each group and 20 died in the control group and 10 in the specially treated group that difference is (on the criterion of "significance" adopted) more than would be likely to occur by chance. If, on the other hand, the improvement was a reduction of the fatality-rate from 40 to 30 per cent. we should need at least 182 patients in each group. If we had 200 in each group and 80 died in the one and 60 in the other, that difference is more than would be likely to occur by chance. Finally, if the fatality-rate was only 4 per cent. in the control group and 2 per cent. in the treated group we should require as many as 600 patients in each group to be able to dismiss chance as a likely explanation. With that number in each group there would be 24 and 12 deaths, and a difference of this order on smaller numbers might well be due to chance. (In such a case the fatality-rate, of course, might not be the best measure of the advantages of the treatment.)

The determination of the numbers required is based, it will be noted, upon the difference observed between the groups. In practice we often do not know what that difference is likely to be, until at least some trials have been made. There can be no answer given in advance to the question "how many observations must be made." Unless there is some indication from past experience as to the kind of difference that may result, or unless we can argue on a priori grounds, we must confess ignorance of the numbers required to give a convincing result.

Common Sense and Figures

Apart from these problems of the errors of sampling, much of my discussion of the interpretation of figures has centred, it will have been noted, not so much on technical methods of analysis but on the application of common sense to figures and on elementary rules of logic. The common errors discussed in previous sections are not due to an absence of knowledge of specialised statistical methods or of mathematical training, but usually to the tendency of workers to accept figures at their face value without considering closely the various factors influencing them—without asking themselves at every turn "what is at the back of these figures? what factors may be responsible for this value? in what possible ways could these differences have arisen?" That is constantly the crux of the matter. Group A is compared with Group B and a difference in some characteristic is observed. It is known that Group A differed from Group B in one particular way—e.g., in treatment. It is, therefore, concluded too readily that the difference observed is the result of the treatment. To reject that conclusion in the absence of a full discussion of the data is *not* merely an example of armchair criticism or of the unbounded scepticism of the statistician. Where, as in all statistical work, our results may be due to more than one influence, there can be no excuse for ignoring that fact. And it has been said with truth that the more anxious we are to prove that a difference between groups is the result of some particular action we have taken or observed, the more exhaustive should be our search for an alternative and equally reasonable explanation of how that difference has arisen.

It is also clearly necessary to avoid the reaction to statistics which leads an author to give only the flimsiest statement of his figures on the grounds that they are dull matters to be passed over as rapidly as possible. They may be dull—often the fault lies in the author rather than in his data—but if they are cogent to the thesis that is being argued they must inevitably be discussed fully by the author and considered carefully by the reader. If they are not cogent, then there is no case for producing them at all. In both clinical and preventive medicine, and in much laboratory work, we cannot escape from the conclusion that they are frequently cogent, that many of the problems we wish to solve *are* statistical and that there is no way of dealing with them except by the statistical method.

A. B. H.

AN ORTHOPÆDIC NURSING CERTIFICATE

THERE are at the present time in this country some thirty orthopædic hospitals most of which issue certificates of proficiency to their nursing staff on completion of their training. These certificates lack uniformity and offer no accepted standard when applications for other posts are being considered. The Central Council for the Care of Cripples, which, since its inauguration in 1920, has acted as a coördinating body in matters concerning the welfare of cripples, now proposes an orthopædic nursing certificate based on a uniform syllabus. In consultation with the principal orthopædic hospitals a scheme for such a certificate has been drawn up and the rules and syllabus have been issued in pamphlet form [1] by the Council. The certificate will be awarded as the result of tests held at the end of the first and second years of training respectively, but probationer nurses who have passed the preliminary State examination will be exempt from the earlier test. The first, which includes anatomy, physiology, hygiene, and practical nursing, both written and oral, will be taken at the training hospital in May or November. The second test on orthopædic conditions and their nursing will be taken partly at the hospital, but for the practical and oral portion examinees will generally be asked to attend at a centre—London, Bristol, Newcastle, or Birmingham—again in May or November. General State-registered nurses will be allowed to sit for the final examination at the end of one year's training. The entrance fee will be 10*s.* 6*d.* for the first test and one guinea for the second. There are five orthopædic surgeons on the executive committee of the Central Council one of whom, Mr. E. S. Evans, has acted as chairman of the subcommittee which drew up the scheme. Dame Agnes Hunt, who is president of the Council, expresses the hope that every orthopædic hospital which offers training to probationers will adopt the certificate, so that its possession may be generally accepted as evidence of sound training in the elements of orthopædic nursing. It is proposed to hold the first examination in November, 1937.

[1] From the secretary of the Council, 34, Eccleston-square, London, S.W.1. 2*d.*, post free.

SPECIAL ARTICLES

MICRO-CHEMICAL METHODS OF BLOOD ANALYSIS

By E. J. KING, M.A., Ph.D. Toronto
READER IN PATHOLOGICAL CHEMISTRY IN THE UNIVERSITY OF LONDON AT THE BRITISH POSTGRADUATE MEDICAL SCHOOL

G. A. D. HASLEWOOD, M.Sc., Ph.D. Lond.
ASSISTANT IN PATHOLOGICAL CHEMISTRY AT THE SCHOOL; AND

G. E. DELORY, B.Sc. Lond.
LABORATORY ASSISTANT IN PATHOLOGICAL CHEMISTRY AT THE SCHOOL

THE methods of blood analysis here described have proved their usefulness in research and routine laboratory work. Some of the methods are modifications of published procedures, while others are new.

A.—PROCEDURES FOR WHOLE BLOOD

Micro-chemical methods of blood analysis are particularly useful in investigations which require the taking of frequent samples of blood. Determinations on capillary blood, as compared with venous blood, are less inconvenient to the patient, who usually objects to numerous and elaborate venipunctures, and are less laborious for the investigator. A puncturing apparatus or a Hagedorn needle, together with a supply of capillary blood pipettes, is much easier to keep and to use than a supply of sterilised syringes and needles.

The accuracy of the micro-methods is usually beyond question, and biochemical methods carried out on small quantities of capillary blood have given at least as consistent and as accurate results as the larger scale procedures from which they usually sprang. The advantage of being able to omit any anti-coagulant substance in the taking of the sample needs no comment. The sample can be measured in most capillary blood pipettes with a high degree of precision; and the possibility of obtaining abnormal proportions of cells and plasma when sampling an improperly mixed specimen of venous blood (a potent source of error not often appreciated) is avoided.

The level of some substances in arterial blood is different and of greater physiological significance than the level in venous blood. This is notably so in the case of glucose. Arterial blood glucose is best estimated in capillary blood, which gives the same value.

The micro-methods described have been developed primarily for use with capillary blood, but they are of course applicable to samples of venous blood.

TAKING OF BLOOD

Blood may be taken from a puncture on the ear or finger, but the most convenient place to obtain capillary blood is probably from the thumb over the bed of the nail. The part is wiped clean with a little ether or spirit and a stab of 1 to 2 mm. deep is made by means of a puncturing apparatus or Hagedorn needle. A piece of soft rubber tubing or of gauze is wrapped fairly tightly about the thumb above the knuckle. On flexing the thumb a free flow of blood is usually obtained. If the blood does not come easily, the rubber is released and the hand shaken in a downwards direction. This operation will ensure an adequate amount of blood when the tourniquet is replaced and the thumb flexed. The pipette is held horizontally with its point in the drop of blood issuing from the stab wound. The blood is allowed to run in exactly to the 0·2 c.cm. mark. The pipette is then wiped, and the blood allowed to run into a 15 c.cm. conical centrifuge tube containing water or isotonic sodium sulphate solution, and by alternate blowing and sucking the pipette is washed several times with the solution.

I.—Estimation of Urea in Blood

Urea represents about 50 per cent. of the non-protein nitrogen of the blood. Normally there are between 20 and 40 mg. of urea present per 100 c.cm. High values are found in conditions associated with impaired renal function—particularly in chronic nephritis, but also in some cases of acute nephritis, prostatic obstruction, cardiac failure, &c.*

PRINCIPLE

The sample of blood is digested with urease, and the urea thus converted into ammonia. After removal of proteins, the colour produced by the ammonia with Nessler's reagent is compared colorimetrically with the colour produced under the same conditions with a standard ammonium chloride solution.

Direct nesslerisation does not lead to the production of cloudiness in the case of protein-free filtrates from unlaked blood. This is due to the fact that the sulphydryl substances glutathione and ergothioniene, which produce turbidities with Nessler's reagent because of the insolubility of their mercury salts, are confined to the cells and do not appear in the filtrate, as is the case with filtrates of laked blood. Filtrates of unlaked blood have the further advantage that no ammonia is contributed to the determination through the action of the arginase of the red cells on the arginine contained in most commercial preparations of urease (see Addis 1928). The use of zinc hydroxide as deproteinising reagent eliminates a small amount of turbidity producing substance contributed by most preparations of urease.

METHOD

0·2 c.cm. of blood is added to a centrifuge tube containing 3·2 c.cm. of isotonic sodium sulphate solution.

A "knife point" (about 20 mg.) of Jack Bean meal is added, and the whole stoppered with a rubber bung, mixed, and incubated at 37° C. for 20 minutes. 0·3 c.cm. of zinc sulphate solution and 0·3 c.cm. of 0·5 N sodium hydroxide are added to precipitate the proteins, and the mixture is centrifuged. 2 c.cm. of the supernatant fluid represent 0·1 c.cm. of blood.

2 c.cm. of the clear supernatant are treated with 5 c.cm. of water and 1 c.cm. of Nessler's reagent. The solution is compared in a colorimeter † with a "high" or "low" standard made up with 2 c.cm. or 5 c.cm. of the standard ammonium chloride solution (0·01 mg. of nitrogen per c.cm.), 5 c.cm.

* No attempt is made to give a complete statement of the amounts of the various substances present in diseased conditions nor to discuss their significance. Brief mention is made only of those clinical conditions in which abnormal values are most commonly encountered.

† A micro-colorimeter or micro-attachments (cups and plungers) for an ordinary Duboscq are necessary for this and other colorimetric procedures. Micro-cups and plungers can now be obtained as interchangeable attachments for almost all the makes of colorimeters commonly in use.

or 2 c.cm. respectively of water, and 1 c.cm. of Nessler's reagent. The colorimetric comparison is facilitated by the use of a blue light filter (see section C).

CALCULATION

(1) "Low" standard:

$$\text{Blood-urea}^{*} \begin{cases} = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}02 \times \dfrac{100}{0{\cdot}1} \times 2{\cdot}14 \\ = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 42{\cdot}8 \end{cases}$$

(2) "High" standard:

$$\text{Blood-urea}^{*} \begin{cases} = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}05 \times \dfrac{100}{0{\cdot}1} \times 2{\cdot}14 \\ = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 107 \end{cases}$$

N.B.—1 mg. of nitrogen ≡ 2·14 mg. of urea.

* mg./100 c.cm. blood.

SOLUTIONS

Nessler's reagent.—As described in Peters and Van Slyke's "Quantitative Clinical Chemistry," Baltimore, 1932, vol. ii, p. 532, and in Beaumont and Dodds's "Recent Advances in Medicine," 8th ed., London, 1936, p. 391.

Standard ammonium chloride solution (containing 0·01 mg. of nitrogen per c.cm.).—153 mg. of pure ammonium chloride are weighed out and dissolved in water. The volume is made up to 100 c.cm. 25 c.cm. of this solution with 10 c.cm. of N sulphuric acid are diluted to 1 litre with distilled water.

Isotonic sodium sulphate.—30 g. of crystalline sodium sulphate ($Na_2SO_4.10\,H_2O$) are dissolved in water and made to 1 litre.

Zinc sulphate.—10 g. of crystalline zinc sulphate ($ZnSO_4.7\,H_2O$) are dissolved in water and made to 100 c.cm.

II.—Estimation of Non-Protein Nitrogen

The non-protein nitrogen containing substances of blood are urea (10–20 mg. N), uric acid (1–2 mg. N), creatinine (0·5–1 mg. N), amino-acid nitrogen (6–8 mg.), and substances such as glutathione and ergothioniene (5–10 mg. N per 100 c.cm. of blood). The normal range of non-protein nitrogen (N.P.N.) is from 25–40 mg. per 100 c.cm. Increased values are found in the conditions showing a high blood-urea.

PRINCIPLE

The proteins of laked blood or plasma are precipitated by trichloracetic acid. Part of the filtrate is digested with sulphuric acid until all the nitrogen is converted into ammonium sulphate. The ammonium salt is estimated colorimetrically with Nessler's solution; excess of which is used for the test in order to neutralise the sulphuric acid and give an alkaline medium.

METHOD

0·2 c.cm. of blood (or plasma) is pipetted into 3·2 c.cm. of water or isotonic sodium sulphate solution. Proteins are precipitated by the addition of 0·6 c.cm. of trichloracetic acid. The tube is stoppered and thoroughly shaken. After five minutes the mixture is filtered.

1 c.cm. of the filtrate (≡ 0·05 c.cm. of blood or plasma) is evaporated in a test-tube with 0·5 c.cm. of 30 per cent. sulphuric acid until the liquid turns dark and white acid fumes are evolved. The cooled liquid is then treated with 1 drop of hydrogen peroxide (99–100 vols.), to destroy any coloured products, and boiled for 4 minutes. To the cooled solution are now added 5 c.cm. of water and 3 c.cm. of Nessler's solution. The colour produced is compared in the colorimeter with the "low" or "high" standard used in the determination of blood-urea.

CALCULATION

(1) "Low" standard:

$$\text{N.P.N.}^{*} \begin{cases} = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}02 \times \dfrac{100}{0{\cdot}05} \\ = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 40 \end{cases}$$

(2) "High" standard:

$$\text{N.P.N.}^{*} \begin{cases} = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}05 \times \dfrac{100}{0{\cdot}05} \\ = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 100 \end{cases}$$

* In mg./100 c.cm. of blood or plasma.

SOLUTIONS

Nessler's reagent, and ammonium chloride standard as described for urea (A.I.).

Trichloracetic acid.—25 g. are dissolved in water and made to 100 c.cm.

30 per cent. sulphuric acid.—30 c.cm. concentrated acid are allowed to run slowly and with shaking into about 60 c.cm. of distilled water in a 100 c.cm. volumetric flask. The mixture is cooled to room temperature, made to the mark, and mixed.

III.—Estimation of Uric Acid in Blood

Uric acid is normally present to the extent of 2–4 mg. per 100 c.cm. of blood. In gout and in certain conditions of renal impairment high values are found.

PRINCIPLE

Blood in isotonic sodium sulphate solution is treated with a phosphotungstic acid reagent. This precipitates the proteins, and on addition of sodium cyanide to the supernatant liquid, the excess of phosphotungstic acid reagent produces a blue colour with uric acid present. The colour is compared with that given by a standard solution of uric acid. The blood must not be laked, as interfering substances, such as glutathione and ergothioniene, would be liberated from the cells.

METHOD

0·2 c.cm. of capillary blood is pipetted into 3·2 c.cm. of isotonic sodium sulphate in a 15 c.cm. centrifuge tube. 0·6 c.cm. of Folin's (1934) uric acid reagent is added. The tube is stoppered, its contents mixed gently by inversion, and immediately centrifuged. 2 c.cm. of the supernatant liquid (≡ 0·1 c.cm. of blood) are treated with 1 c.cm. of sodium cyanide-urea reagent. At the same time a mixture of 1 c.cm. of the uric acid "blood" standard (≡ 0·004 mg. uric acid), 0·7 c.cm. of distilled water, and 0·3 c.cm. of Folin's reagent is treated also with 1 c.cm. of sodium cyanide-urea reagent. The two tubes are placed in a boiling water-bath for 5 minutes, cooled, and the solutions compared colorimetrically.

CALCULATION

$$\text{Uric acid}^{*} \begin{cases} = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}004 \times \dfrac{100}{0{\cdot}1} \\ = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 4 \end{cases}$$

* mg./100 c.cm. of blood.

SOLUTIONS

Isotonic sodium sulphate as under blood-urea (A.I.).

Sodium cyanide-urea reagent.—5 g. of sodium cyanide and 20 g. of urea are dissolved in water, and the volume made to 100 c.cm. The urea prevents clouding during the determination.

Folin's (1934) uric acid reagent.—(1) Preparation of molybdate-free sodium tungstate: a solution of 250 g. of sodium tungstate in 500 c.cm. of water is treated with 5 N hydrochloric acid until neutral to litmus paper. The

solution is saturated with hydrogen sulphide, and allowed to stand 24 hours.[1] It is then treated with 400 c.cm. of absolute alcohol, added gradually with constant shaking. The mixture, after standing for a further 24 hours, is filtered, and the precipitate washed with 50 per cent. alcohol and dissolved in 375 c.cm. of water. 0·5 c.cm. of bromine is added, and the mixture boiled gently until the excess bromine is dispelled. Sodium hydroxide solution (40 g. per 100 c.cm.) is now added to the hot solution until the latter is alkaline to phenolphthalein. The cooled solution, filtered if necessary, is treated with 200 c.cm. of absolute alcohol, and allowed to stand for 24 hours. The white crystals are filtered off and dried in a desiccator.

(2) Preparation of reagent: 100 g. of molybdate-free sodium tungstate are treated gradually with a solution of 30 c.cm. of "syrupy" phosphoric acid (89 per cent.) in 150 c.cm. of water. The mixture is boiled gently under reflux for 1 hour, decolorised as above with a drop of bromine, cooled and diluted to 500 c.cm.

Stock uric acid standard (Folin) (≡ 1 mg. per c.cm.).—1 g. of uric acid is placed in a 1-litre flask. 0·6 g. of lithium carbonate is dissolved in 150 c.cm. of cold water. The carbonate solution, filtered if necessary and warmed to 60° C., is added to the flask containing the uric acid, which is warmed under the hot tap. The warm mixture is shaken for five minutes, cooled at once under the tap, and treated with 20 c.cm. of formalin (40 per cent. solution of formaldehyde) and enough water to fill half the flask. A few drops of methyl-orange are added, and then gradually with shaking, 25 c.cm. of N sulphuric acid. The solution should turn pink when 2–3 c.cm. of acid remain to be added. The mixture is now diluted to 1 litre, mixed and stored in the dark in a stoppered bottle, when it will keep almost indefinitely.

Uric acid "blood" standard (≡ 0·004 mg. per c.cm.).—2 c.cm. of the above "stock" standard solution are diluted with water and 1 c.cm. of 40 per cent. formalin to 500 c.cm. This solution should be made up fortnightly

IV.—Creatinine in Blood

PRINCIPLE

Creatinine gives a red colour with alkaline solutions of picric acid (Jaffé's reaction). A similar colour is also given by blood (and plasma) filtrates. It is not certain that the colour in this case is due to creatinine, but the substance which may thus be estimated as blood "creatinine" is of some clinical importance. Calculated as "creatinine" the normal values are 1–2 mg. per 100 c.cm. of blood. In advanced renal failure enhanced values may be found.

METHOD

0·2 c.cm. of blood is added to 1·4 c.cm. of isotonic sodium sulphate solution. 0·2 c.cm. of zinc sulphate solution and 0·2 c.cm. of 0·5 N sodium hydroxide are added, and the tube is stoppered and shaken. The mixture is centrifuged, and 1 c.cm. of the clear supernatant fluid (≡ 0·1 c.cm. of blood) is used as "test" solution (see Somogyi 1930).

For normal blood a "standard" solution is made by diluting 1 c.cm. of the creatinine "blood" standard described below, with 4 c.cm. of water. The "test" solution and 1 c.cm. (≡ 0·001 mg. of creatinine) of this "standard" solution are then treated at the same time with 0·5 c.cm. of freshly made alkaline picrate solution (see below). After not more than 15 minutes the solutions are compared in the colorimeter, using a blue-green light filter, such as Ilford's spectrum blue-green (see section C).

CALCULATION

$$\text{Blood "creatinine"}^{*} \begin{cases} = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}001 \times \dfrac{100}{0{\cdot}1} \\ = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 1{\cdot}0 \end{cases}$$

* mg. per 100 c.cm. blood.

In cases where a raised blood "creatinine" is found or expected, stronger "standards" may be made by using larger quantities of the "blood standard," and diluting these as before to 5 c.cm. with water. In general the calculation becomes:—

$$\left.\begin{matrix}\text{Blood} \\ \text{"creatinine"}\end{matrix}\right\} = \frac{\text{Reading of standard}}{\text{Reading of test}} \times \text{C} \times 0{\cdot}001 \times \frac{100}{0{\cdot}1}$$

where C is the number of c.cm. of "blood" standard used in the 5 c.cm. of "standard" solution.

Preparation of solutions.—Isotonic sodium sulphate, 10 per cent. zinc sulphate, and 0·5 N sodium hydroxide as under blood-urea (A.I.).

Creatinine "stock" standard (containing 1 mg. of creatinine per c.cm.).—1·602 g. of pure creatinine zinc chloride are dissolved in N/10 hydrochloric acid solution, and the volume made up with the N/10 acid to 1 litre.

Creatinine "blood" standard (0·005 mg. per c.cm.).—5 c.cm. of the above "stock" standard are treated with 10 c.cm. of N/10 hydrochloric acid and the volume made up with water to 1 litre.

Alkaline picrate solution.—Five parts (by volume) of a saturated aqueous solution of *pure* picric acid, containing about 15 g. picric acid per litre, are mixed with 1 part (by volume) of 10 per cent. sodium hydroxide.

Note.—The picric acid may be purified by recrystallisation from glacial acetic acid. It must be of such purity that when 10 c.cm. of a saturated aqueous solution are treated with 5 c.cm. of the 10 per cent. hydroxide, the colour (determined in the colorimeter) of the alkaline mixture so formed is not more than twice as deep as that of the saturated picric acid solution.

V.—Inorganic Phosphate

The blood of normal adult persons contains 2–3 mg. per 100 c.cm. (expressed as P) of inorganic phosphate. In conditions involving an acidosis, such as is often found in nephritis, the amount present may be definitely raised. The amount of phosphate present in the blood of children, where bone formation is not yet complete, is at a higher level—usually of about 5 mg. per 100 c.cm. In rachitic conditions the figure is lowered.

PRINCIPLE

The inorganic phosphate of a deproteinised filtrate of the blood is coupled with molybdate, and the yellow phospho-molybdate is reduced to give a blue substance. The amount of blue colour produced in the solution is directly proportional to the amount of phosphate present.

METHOD

0·2 c.cm. of whole blood or plasma is pipetted into 3·2 c.cm. of water or isotonic sodium sulphate and treated with 0·6 c.cm. of 25 per cent. trichloracetic acid. The mixture is shaken well, and after 5 minutes filtered through a small paper. 2 c.cm. of the clear filtrate (≡ 0·1 c.cm. of blood or plasma) are treated at the same time as 2 c.cm. of the dilute standard phosphate solution (≡ 0·004 mg. P) with 0·3 c.cm. of the ammonium molybdate solution followed by 0·2 c.cm. of the reducing agent (amino-naphtholsulphonic acid). The contents of the tubes are gently shaken between each addition, and the colours are read after 10 minutes in a colorimeter (King 1932).

CALCULATION

$$\text{Blood phosphate}^{*} \begin{cases} = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}004 \times \dfrac{100}{0{\cdot}1} \\ = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 4 \end{cases}$$

* mg. P/100 c.cm. of blood.

SOLUTIONS

Trichloracetic acid solution.—As under non-protein nitrogen (A.II.).

Ammonium molybdate.—5 g. of ammonium molybdate are added to a mixture of 75 c.cm. distilled water and

15 c.cm. of concentrated sulphuric acid in a 100 c.cm. volumetric flask. The mixture is shaken until dissolution is complete, and cooled to room temperature. The solution is then made up to 100 c.cm. and mixed.

Reducing agent.—0·2 per cent. aminonaphtholsulphonic acid. 0·2 g. of the 1 : 2 : 4-acid, 12 g. sodium metabisulphite, and 2·4 g. crystalline sodium sulphite are dissolved by shaking with enough water to make 100 c.cm. If the solution does not filter clear it should be left overnight and filtered again. A fresh solution should be prepared every two weeks.

Standard phosphate.—A stock solution is made by dissolving 2·194 g. of pure potassium dihydrogen phosphate (KH_2PO_4) in 500 c.cm. in water. This solution contains 1 mg. P per c.cm. A *dilute standard solution* is made by diluting 2 c.cm. of the stock solution to 1 litre with water. 1 c.cm. of this solution contains 0·002 mg. P. Both solutions should be kept saturated with chloroform to prevent any bacterial growth, which might cause a loss of inorganic phosphate.

VI.—Cholesterol in Blood

Total cholesterol in the blood of normal persons may be present in amounts varying from 120 to 230 mg. per 100 c.cm. The amounts present in blood may be raised in severe diabetes, biliary obstruction, and in some forms of nephritis (particularly the nephrotic type). Low values are found in severe anæmia.

The method recommended is that described in detail by Sackett (1925).

VII.—Glucose

Harding's (1932, 1933) modification of the Schaffer Hartmann method. This method gives "true sugar values" as opposed to total reducing substances when applied to filtrates of unlaked blood.

PRINCIPLE

The "sugar" in whole blood is a mixture of glucose, present mainly in the plasma, and nitrogenous reducing compounds (chiefly glutathione) in the corpuscles. It is possible to exclude the corpuscles by mixing the blood with isotonic sodium sulphate solution, in which the corpuscles remain intact. A determination of the reducing power then becomes equivalent to an estimation of glucose alone. For normal (fasting) individuals values of 65–90 mg. per 100 c.cm. are found.

METHOD

0·2 c.cm. of blood is added to 3·2 c.cm. of isotonic sodium sulphate. After 4 minutes' standing to allow diffusion from the cells, 0·3 c.cm. of zinc sulphate solution and of 0·5 N sodium hydroxide are added. ‡ The mixture is shaken and then centrifuged.

2 c.cm. of the supernatant liquid (≡0·1 c.cm. of blood) are treated with 2 c.cm. of the mixed copper reagent in a wide (¾ in.) test-tube. A "blank" is prepared with 2 c.cm. of distilled water and 2 c.cm. of reagent. Both tubes, stoppered lightly with cotton-wool, are placed in a boiling water bath for exactly 10 minutes. They are then cooled at once under the tap. To each is added 2 c.cm. of 1 per cent. potassium iodide and 2 c.cm. of N sulphuric acid. After standing 1 minute the contents of each tube are titrated with N/200 sodium thiosulphate. One per cent. soluble starch (made up in water or, better, in saturated phenol red solution) is used as indicator. The titration figure of the test solution is subtracted from that of the "blank."

‡ If the sugar determination cannot be made immediately, it is advisable to keep the blood in an isotonic sodium sulphate containing fluoride and thymol—see solutions.

CALCULATION

1 c.cm. N/200 thiosulphate ≡ 0·116 mg. glucose.

The c.cm. of thiosulphate given by the difference between the "blank" and "test" titrations is equivalent to the amount of glucose present in the "test." Hence—

c.cm. N/200 thiosulphate × 0·116 = mg. glucose in 2 c.cm. filtrate (i.e., in 0·1 c.cm. blood).

And, therefore—

$$\left.\begin{array}{l}\text{c.cm. N/200 thiosulphate} \\ \times\ 0{\cdot}116 \times \dfrac{100}{0{\cdot}1}\end{array}\right\} = \text{mg. of glucose/100 c.cm. blood.}$$

$$\left.\begin{array}{l}\text{i.e., c.cm. of N/200 thio-} \\ \text{sulphate} \times 116\end{array}\right\} = \text{mg. of glucose/100 c.cm. blood.}$$

If the blood-sugar value thus obtained is greater than 400 mg./100 c.cm., the determination should be repeated, using as test solution a mixture of 1 c.cm. of filtrate and 1 c.cm. of water. The result then obtained is multiplied by 2.

SOLUTIONS

Isotonic sodium sulphate containing fluoride and thymol to prevent glycolysis—100 mg. of sodium fluoride and 10 mg. of thymol are dissolved in 100 c.cm. of the 3 per cent. sodium sulphate. 10 per cent. zinc sulphate; and 0·5 N sodium hydroxide as for blood-urea (A.I.).

Copper reagent.—Solution A: 13 g. copper sulphate crystals are dissolved in water and the volume made up to 1 litre.

Solution B is made by dissolving: 24 g. rochelle salt (sodium potassium tartrate), 40 g. anhydrous sodium carbonate, 50 g. sodium bicarbonate, 36·8 g. potassium oxalate, and exactly 1·4 g. potassium iodate *separately* in the minimum quantities of water at room temperature. The solutions are then mixed and the volume made up to 1 litre.

The "copper reagent" is a freshly made mixture of *exactly equal volumes* of solutions A and B.

Note.—Only purest analytical chemicals should be used in making up the above reagent. When preparing a fresh copper reagent, it is advisable to check it against a solution of pure glucose.

B.—PROCEDURES FOR PLASMA

I.—Plasma Proteins

The total quantity of protein in blood plasma varies in normal individuals from approximately 6 to 8 g. per 100 c.cm. Plasma protein is divided into two main fractions: globulin and albumin. Globulin includes fibrinogen. Normally the approximate amounts of the proteins in plasma are albumin 3·4–6·0 g. per 100 c.cm.; globulin (excluding fibrinogen) 1·5–3·0 g. per 100 c.cm.; fibrinogen 0·2–0·4 g. per 100 c.cm. Where there is decrease of plasma protein—e.g., through proteinuria or malnutrition—the albumin is chiefly affected, and there is often a reduction of the albumin-globulin ratio (normally 1·3–4·0). A reduction of this kind is characteristic of nephrosis. An increase in the globulin, especially fibrinogen, may accompany inflammatory conditions.

PRINCIPLE

Oxalated plasma diluted with isotonic sodium chloride is used for estimation of total protein. Another portion of the diluted plasma is treated with calcium chloride, and the fibrin clot removed. A further (fresh) sample of plasma is treated with saturated sodium sulphate solution, which precipitates the "globulin," and the filtrate is used for estimation of "albumin." For total protein, and "albumin," the protein is precipitated with zinc sulphate and sodium hydroxide, the precipitates and the fibrin clot being then digested with sulphuric acid and hydrogen peroxide. The protein nitrogen is estimated

colorimetrically, as ammonium sulphate, with Nessler's solution. The nitrogen figures multiplied by 6·25 give the approximate protein values, which are expressed as grammes per 100 c.cm. of plasma.

METHOD

(*A*) *Total protein.*—0·2 c.cm. of plasma (from oxalated blood) in a 10 c.cm. volumetric flask is diluted to 10 c.cm. with isotonic (0·9 g. per 100 c.cm.) sodium chloride. 0·2 c.cm. of this solution (≡ 0·004 c.cm. of plasma) is pipetted into 4 c.cm. of water in a Pyrex centrifuge tube. 0·1 c.cm. of zinc sulphate and 0·1 c.cm. of 0·5 N sodium hydroxide are added with mixing, and the precipitate is centrifuged down.

When the supernatant liquid has been carefully decanted, the inverted tube is drained on a filter paper. 0·5 c.cm. of 30 per cent. sulphuric acid is added, together with a small piece of porous pot. The mixture is gently boiled until blackening occurs and white acid fumes appear. One drop of hydrogen peroxide (99–100 vols.) is added to the cooled solution, and boiling continued for 4 minutes. To the cold colourless solution are added 5 c.cm. of water and 3 c.cm. of Nessler's solution. The colour is compared with a standard prepared from 5 c.cm. of the standard ammonium chloride solution (containing 0·01 mg. of nitrogen per c.cm.), 2 c.cm. of water, and 1 c.cm. of Nessler's solution.

CALCULATION

$$\text{Total protein (A)}^{*} \begin{cases} = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}05 \times \dfrac{100}{0{\cdot}004} \times \dfrac{6{\cdot}25}{1000} \\ = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 1{\cdot}25 \times 6{\cdot}25 \end{cases}$$

* g./100 c.cm. of plasma.

(*B*) *Fibrin.*—To another 5 c.cm. (≡ 0·1 c.cm. of plasma) of the solution of plasma in isotonic sodium chloride, placed in a narrow tube, is added 0·1 c.cm. of calcium chloride solution. The mixture is kept at 37° C. until clotting occurs. The fibrin is carefully collected on a thin glass rod, pressed to remove liquid, washed with water, and dropped into a test-tube for digestion. This, and also the colorimetric estimation, is carried out exactly as in the case of total protein.

CALCULATION

$$\text{Fibrin (B)}^{*} \begin{cases} = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}05 \times \dfrac{100}{0{\cdot}1} \times \dfrac{6{\cdot}25}{1000} \\ = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}05 \times 6{\cdot}25 \end{cases}$$

* g./100 c.cm. of plasma.

(*C*) "*Albumin.*"—0·2 c.cm. of plasma is placed in a 5 c.cm. volumetric flask. The volume is made up to 5 c.cm. with a saturated solution of sodium sulphate. The mixture is kept at 37° C. for 3 hours and is then filtered through a fine filter paper. 0·2 c.cm. of the filtrate (≡ 0·008 c.cm. of plasma) is placed in 4 c.cm. of water in a Pyrex centrifuge tube and the protein precipitated with zinc sulphate and sodium hydroxide, drained, digested, and estimated as ammonium sulphate exactly as in the case of total protein.

CALCULATION

$$\text{"Albumin" (C)}^{*} \begin{cases} = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}05 \times \dfrac{100}{0{\cdot}008} \times \dfrac{6{\cdot}25}{1000} \\ = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}625 \times 6{\cdot}25 \end{cases}$$

$$\text{"globulin" D}^{*} \begin{cases} = \text{Total protein} - \text{fibrin} + \text{"albumin"} \\ = \text{A} - (\text{B} + \text{C}) \end{cases}$$

* g./100 c.cm. of plasma.

Note.—A blue filter may be used with advantage in this colorimetric comparison (see section C).

SOLUTIONS

Thirty per cent. sulphuric acid, Nessler's reagent, and standard ammonium chloride as for urea and non-protein nitrogen (A. I. and II.).

Calcium chloride.—2·5 g. per 100 c.cm. in water.

Saturated sodium sulphate.—22·2 g. of anhydrous sodium sulphate (Na_2SO_4) dissolved in warm water and made to 100 c.cm. The solution is kept at about 37° C.

II.—Bilirubin

Normal blood contains small amounts of the yellow pigment bilirubin.§ These quantities may be greatly increased in various types of jaundice.

PRINCIPLE

The plasma is treated with diazotised sulphanilic acid, with the addition of ammonium sulphate and alcohol to precipitate the protein. The red colour produced was originally compared colorimetrically against a standard solution of bilirubin, treated with diazotised sulphanilic acid. This is, however, difficult to obtain pure, and various artificial "permanent standards" have been devised. The most satisfactory is that containing methyl-red (*o*-carboxybenzene-azo-dimethylaniline—2·9 mg. per litre at *p*H 4·63) in sodium acetate buffer. The colour of this solution accurately matches the colour obtained when 0·1 mg. of bilirubin is treated with the diazo reagent in a final volume of 25 c.cm.

METHOD

1 c.cm. of plasma is treated in a centrifuge tube with 0·5 c.cm. of diazo reagent‖, 0·5 c.cm. of saturated ammonium sulphate, and finally 3 c.cm. of absolute ethyl alcohol. The mixture is stoppered, thoroughly mixed, allowed to stand for a few minutes, and filtered. Under these conditions the dilution of the plasma closely approximates to 1 in 4, allowance being made for the volume of the precipitate and for the change in volume when alcohol is added to water. The colour of the clear filtrate is compared with the standard mentioned above (≡ 0·1 mg. of bilirubin in a volume of 25 c.cm.) (Haslewood and King 1937).

CALCULATION

$$\text{Bilirubin}^{*} \begin{cases} = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 0{\cdot}1 \times \dfrac{4}{25} \times \dfrac{100}{1} \\ = \dfrac{\text{Reading of standard}}{\text{Reading of test}} \times 1{\cdot}6 \end{cases}$$

* mg./100 c.cm. plasma.

It is frequently found that brownish or purplish tints produced in the reaction make colorimetric comparison with the artificial standard difficult. These extraneous colours (probably due to traces of substances other than bilirubin which react with the diazo reagent) may be eliminated by the use of a coloured light filter (see section C).

The green filter (Ilford spectral green ¼ in. diameter is an appropriate type) is placed over the eye-piece of the colorimeter and the reading made against the artificial standard. The adjustment is then made in a green field whose two halves are of exactly the same quality of colour, and differ only in intensity. The reading is taken in the usual way.

SOLUTIONS

Stock standard methyl-red solution.—0·29 g. of pure methyl-red is dissolved in glacial acetic acid and the volume made to 100 c.cm.

§ There is no generally accepted range of normal values for blood bilirubin. Research in progress suggests that the normal values determined by this method fall within the range 0·1 to 1·3 mg. per 100 c.cm. of plasma, with the majority of the values within the limits 0·3 to 0·8 (Vaughan and Haslewood 1937).

‖ If the diazo reagent is carefully "layered" above the plasma, and the tube allowed to stand for a few moments, a positive "direct" reaction (if present) may be seen at the liquid junction.

Methyl-red standard (2·9 mg. per litre at *p*H 4·63).—1 c.cm. of the above standard is placed in a litre flask, together with 5 c.cm. of glacial acetic acid. Water is added, and 14·4 g. of crystallised sodium acetate are washed into the flask. When dissolution is complete, the volume is made to 1 litre with water.

The diazo reagent.—This is made by mixing two solutions A and B.

Solution A is made by dissolving 1 g. of sulphanilic acid in 250 c.cm. of N hydrochloric acid, and making the volume to 1 litre with water.

Solution B contains 0·5 g. of sodium nitrite in 100 c.cm. of aqueous solution.

The diazo reagent mentioned above is made freshly before use by mixing 0·3 c.cm. of solution B with 10 c.cm. of solution A.

III.—Plasma Phosphatase

PRINCIPLE

The estimation of phosphatase depends upon measuring the amount of hydrolysis which takes place when the enzyme is allowed to act on a suitable substrate—an ester of phosphoric acid (such as phenyl phosphate) under standard condition. The amount of phosphate or phenol so liberated may be taken as the measure of the amount of enzyme present. The phenol is more conveniently determined than the phosphate, and three times as much phenol as phosphorus is set free. The hydrolysis is carried out at the optimum *p*H of 10 for 15 minutes. The results thus obtained agree very closely with those of the method of King and Armstrong (1934), of which this is a modification, and with the method of Jenner and Kay (1932). The results are expressed in arbitrary "units" of phosphatase activity. By this method the blood of normal individuals contains 5–10 units per 100 c.cm. of plasma. Great increases are found in cases of generalised bone disease and obstructive jaundice. Infective and toxic jaundice show smaller increases.

METHOD

Test.—In a conical centrifuge tube are placed 4 c.cm. of buffer substrate. The tube is allowed to remain in a water-bath at 37° C. for 5 minutes. Without removal of the tube from the bath, exactly 0·2 c.cm. of plasma (which must be cell-free) is added and mixed. The stoppered tube is allowed to remain in the bath exactly 15 minutes. At the end of this time 1·8 c.cm. of dilute phenol reagent are added and the mixture centrifuged or filtered.

Control.—In another tube are placed 4 c.cm. of buffer substrate. 0·2 c.cm. of plasma, and at once 1·8 c.cm. of dilute phenol reagent are added, and the mixture centrifuged or filtered.

4 c.cm. of filtrate from the test and control solutions are pipetted into test-tubes. 1 c.cm. of 20 per cent. sodium carbonate is added, and the tubes replaced in the water-bath for 5 minutes to bring up the colour.

Comparison.—The solutions are compared in the colorimeter with a standard made up at the same time by taking 4 c.cm. of standard-phenol-solution-and-reagent and 1 c.cm. of 20 per cent. sodium carbonate. The tested solution is placed on the left-hand side of the colorimeter and set at 30 mm. The standard is placed on the right-hand side and the colours matched. The use of an orange or red filter will be found to increase the ease of colorimetric comparison, particularly with weak solutions (see section C).

CALCULATION

The phosphatase activity of a plasma is expressed as units per 100 c.cm. and is numerically equal to the mg. of phenol which would be set free from the phenyl phosphate under the standard conditions by 100 c.cm. of plasma. Thus:—

Units of phosphatase per 100 c.cm. = mg. phenol per 100 c.cm. plasma in test *minus* mg. phenol per 100 c.cm. plasma in control.

The number of mg. phenol in 100 c.cm. of plasma in the test and in the control is found by the equation:—

$$\frac{\text{Reading of standard}}{\text{Reading of "test"}} \times \text{strength of standard} \times \frac{6}{4} \times \frac{100}{0{\cdot}2}$$

With the unknown solution set at 30 mm. and the strength of standard = 0·04 mg. this equation can be written:—

$$\frac{\text{Reading of standard}}{30} \times 0{\cdot}04 \times \frac{6}{4} \times \frac{100}{0{\cdot}2}$$

All figures in the above equation cancel out, making it equal to "Reading of Standard."

More simply then:—

Units of phosphatase per 100 c.cm. = Reading of standard against the test *minus* Reading of standard against the control.

SOLUTIONS

1. *Buffer substrate.*—M/200 phenyl phosphate in M/20 sodium carbonate—M/20 bicarbonate buffer. 1·09 g. di-sodium phenylphosphate, 5·3 g. anhydrous sodium carbonate, and 4·2 g. sodium bicarbonate are dissolved in water and made to 1 litre. The mixture is preserved in a well-stoppered bottle with a few drops of chloroform, and kept in the ice-chest when not in use.

2. *Phenol reagent of Folin and Ciocalteau.*—As described in Peters and Van Slyke's "Quantitative Clinical Chemistry," vol. ii, p. 665, and Beaumont and Dodds's "Recent Advances in Medicine," 8th ed., p. 403. This reagent is diluted 1 in 3.

3. *20 per cent. sodium carbonate* (w/v).—20 g. of anhydrous sodium carbonate are dissolved in warm water and made to 100 c.cm. This solution is preserved in a warm place, otherwise the sodium carbonate tends to crystallise out.

4. *Stock standard phenol* (100 mg. per 100 c.cm.).—1 g. pure crystalline phenol is dissolved in, and made up to 1 litre with 0·1 N HCl.

5. *Diluted stock standard phenol* (10 mg. per 100 c.cm.).—Made by a suitable dilution of (4). (This keeps for at least three months in the ice-box.)

6. *Standard-phenol-solution-and-reagent* (1 mg. phenol per 100 c.cm.).—5 c.cm. of diluted stock standard (10 mg. per 100 c.cm.) and 15 c.cm. diluted phenol reagent are made up with water to 50 c.cm. This solution should be made freshly for use, but will keep several days if preserved in the ice-chest.

IV.—Plasma Chloride

The blood plasma of normal persons contains from 560–620 mg. of chlorides (per 100 c.cm. expressed as NaCl). A decreased plasma chloride may occur in febrile conditions, particularly pneumonia, Addison's disease, and in cases of gastro-intestinal disturbances associated with vomiting or with diarrhœa.

PRINCIPLE

The method is based on the reaction

$$NaCl + AgIO_3 \rightarrow AgCl + NaIO_3$$

Silver iodate in ammoniacal solution is added to the deproteinised filtrate of blood or plasma. The excess of silver iodate, together with the silver chloride formed, is precipitated by the addition of acid, leaving in solution an amount of soluble iodate equivalent to the amount of chloride originally present. After the addition of potassium iodide, the amount of iodine set free from this soluble iodate is determined by titration with thiosulphate.

METHOD

0·2 c.cm. of plasma is added to 1 c.cm. of water. 0·4 c.cm. of zinc sulphate solution and 0·4 c.cm. of 0·5 N sodium hydroxide are added and thoroughly mixed. The mixture is then centrifuged. 1 c.cm.

of the supernatant liquid (≡ 0·1 c.cm. of plasma) is treated with silver iodate reagent (0·5 c.cm.) and, after mixing, with 2 N sulphuric acid (0·5 c.cm.). The mixture is shaken and filtered through a small fine paper. 1 c.cm. of filtrate (≡ 0·05 c.cm. of plasma), with the addition of 1 c.cm. of 1 per cent. potassium iodide, is titrated with 0·005 N sodium thiosulphate, with starch as indicator (Haslewood and King 1936).

CALCULATION

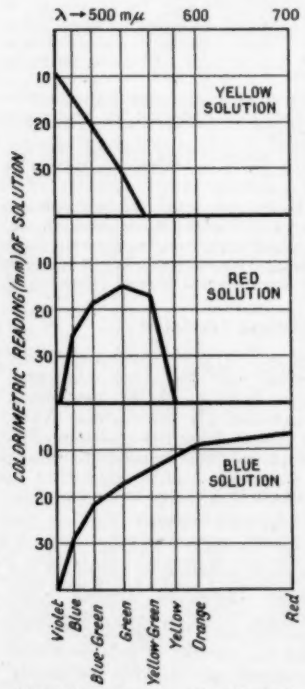
Chloride (as mg. NaCl/100 c.cm. of blood) = 97·5 × titre.

SOLUTIONS

Preparation of silver iodate reagent.—Silver iodate is prepared by mixing equimolecular solutions of silver nitrate and potassium iodate. The precipitate is filtered, washed with distilled water, dried in vacuo, and preserved in the dark. 2 g. of the dried solid are dissolved in 100 c.cm. N ammonia. Both silver iodate and its ammoniacal solution appear to decompose slightly when kept, with liberation of soluble iodate. Immediately before a series of determinations, therefore, 5 c.cm. of the stock (2 per cent.) ammoniacal silver iodate are acidified with 2 N sulphuric acid (5 c.cm.) and centrifuged. The supernatant fluid is discarded and the iodate redissolved in 5 c.cm. of fresh N ammonia.

C.—PHOTOMETRIC MEASUREMENT WITH THE ORDINARY COLORIMETER

Photometric measurement of the intensity of colour in a solution is preferable, for analytical purposes, to colorimetric comparison with standard solutions. More accurate measurement of the colour is possible, and interference by extraneous colours—a source of frequent trouble in colorimetry—can be avoided. Photometers are, however, expensive, and most laboratories are already equipped with colorimeters of the Duboscq type. By the use of light filters and neutral grey screens it is possible to make photometric measurements with the ordinary Duboscq colorimeter.¶ By placing the light filter on the top of the eyepiece, and using daylight or artificial illumination, virtually monochromatic light is obtained. Neutral grey screens serve as standards of light absorption.** The neutral screen is placed on the left-hand rack of the colorimeter, and the rack screwed up till the screen is against the bottom of the plunger. The coloured solution is placed in the right-hand cup and its depth is adjusted until the two fields appear equal. This depth gives the measure of the light absorbed by the solution, which is equal to that absorbed by the neutral grey screen. The absorption will vary for lights of different wavelength as given by the different filters. With the filter showing maximum absorption the reading (millimeters of solution) will be minimum; and the depths of two different solutions of the same coloured substance should be in inverse ratio to the strengths of the solutions. Generally speaking absorption will be found to be maximum for red solutions in the green or blue-green, and conversely, green solutions will show maximum absorption in the red. Blue and violet solutions are maximally absorbing in the yellow, orange, and red; and yellow and orange solutions in the blue and violet.



Absorption curves of standard solutions (neutral grey screens, spectral filters). Yellow solution: nesslerised ammonium chloride solution (strong urea standard); neutral screen, density 0·75. Red solution: bilirubin standard, 0·1 mg. in 25 c.cm. (Haslewood and King 1937); neutral screen, density 0·50. Blue solution: uric acid standard; neutral screen, density 0·50.

¶ The spectral filters of Messrs. Ilford Ltd. are appropriate for the purpose. A set of 8 gelatin spectral filters, mounted in glass (grade "A" glass, ¼ in. diameter, is suitable), can be obtained covering the visible spectrum.

The grey screen of an appropriate density, together with the light filter showing maximum absorption, may be used as a permanent standard for any colorimetric method. It should be calibrated against the coloured solution of known strength—the "standard"; and the general equation for calculating the result for an unknown solution—the "test"—then becomes:—

$$\frac{\text{Read. of std. against grey screen}}{\text{Read. of test against grey screen}} \times \text{Conc. of std.} = \text{Conc. of test.}$$

When comparison of an unknown solution with a known standard of the same substance is made, using the light filter showing maximum absorption, the accuracy of matching is increased; and interference by other contaminating colours is minimised because they are not maximally absorbing for light of the wave-length being used.

REFERENCES

Addis, T. (1928) *Proc. Soc. exp. Biol. Med.* **25**, 365.
Folin, O. (1934) *J. biol. Chem.* **106**, 311.
Harding, V. J., and Downs, C. E. (1933) *Ibid*, **101**, 487.
— Nicholson, T. F., Grant, G. A., Hern, G. and Downs, C. E. (1932) *Trans. R. Soc. Canad.* 3rd series, **26** (v), 33.
Haslewood, G. A. D., and King, E. J. (1937) *Biochem. J.* **31**, in press.
— — (1936) *Ibid*, **30**, 902.
Jenner, H. D., and Kay, H. D. (1932) *Brit. J. exp. Path.* **13**, 22.
King, E. J. (1932) *Biochem. J.* **26**, 292.
— and Armstrong, A. R. (1934) *Canad. med. Ass. J.* **31**, 376.
Sackett, G. E. (1925) *J. biol. Chem.* **64**, 203.
Somogyi, M. (1930) *Ibid*, **87**, 339.
Vaughan, J., and Haslewood, G. A. D. (1937) to be published.

** For example, Ilford neutral grey screens of 0·25, 0·50, and 0·75 densities. These should also be obtained mounted in glass (grade "A"); 1 in. is the most suitable diameter.

WEMBLEY HOSPITAL.—The demands upon this institution are very heavy and ever increasing, and an extension scheme has been prepared which will cost £28,000. A nurses' home and more accommodation for women and children will be provided.

WOMEN IN SOVIET RUSSIA.—The central statistical department of the State Planning Commission of the U.S.S.R. announces that in 1936 the number of women employed at the factories, in agriculture, transport, trade, public catering, health protection, education, &c., was 8,492,000, forming 34 per cent. of the total number of employed workers. There were 15,338 women scientific workers and 42,353 women doctors—a little less than half the total doctors in the country. The number of welfare centres for mothers and infants grew from 2475 in 1928 to 3945 in 1936, and during the same period the number of maternity beds increased from 32,773 to 48,250.

SPECIAL UNITS OF THE L.C.C. HOSPITAL SERVICE

A FEATURE of the hospital organisation of the London County Council is the segregation of certain types of cases requiring special treatment, so as to allow of this treatment being under the control of teams of consultants skilled in the various specialties. The advantages are obvious: the comparison of results in a large number of cases is clearly of more value when these are under unit control, with accessory factors, such as nursing personnel, kept constant; multiplication of consultants and of equipment is avoided; and the reservation of a number of beds in one hospital for the same type of case enables the resident staff, both medical and nursing, to become specially skilful in its treatment.

Brief accounts of the work of these special units during the past year may be read in the Annual Report of the London County Council, 1935 (Vol. IV, Part III, Public Health—Medical Supplement to the Report of the Hospital Services [1]).

The *puerperal fever unit* at the North-Western Hospital was in the charge of Dr. A. Joe, with Dr. Hilda Davis as assistant medical officer and Dr. J. M. Wyatt as consultant obstetrician; 184 cases were treated during the year, of which 156 were of uterine sepsis and associated complications with 11 deaths; the fatal cases are subjected to detailed analysis. Urinary infections complicated 42 out of the 156 cases of uterine sepsis. Towards the latter part of 1935 5 cases of *B. coli* infection were treated with mandelic acid when they had passed the acute febrile stage; in all the urine became sterile after a period of between 7 and 17 days.

A report on the *radium centre for carcinoma of the uterus* at the Lambeth Hospital supplies a very detailed table showing the cases of carcinoma of the cervix or corpus treated during each year from 1928 to 1934, divided into stages and differentiated between those confirmed histologically and those not confirmed. This table and the comments on propaganda on p. 92 merit serious attention. The gynæcological surgeon to this centre is Mr. Arnold Walker, with Sir Comyns Berkeley as consulting gynæcological surgeon.

Mr. George Stebbing, the surgeon specialist, Dr. P. Berry, Dr. T. M. Robb, and Mr. L. H. Clark as physicist, report on the radiotherapeutic clinic at the Lambeth Hospital. During the year under review 567 new patients were placed on the records of this clinic. A number of patients who had already had treatment by surgical operations or by radiotherapy elsewhere and had tumours at a very advanced stage were not included among these 567 cases, as they were deemed unlikely to respond favourably, though palliative treatment was expected to make them much more comfortable. The results obtained are set out in tables which show the crude survival-rate up to five years for those treated in 1930, and since special attention is paid by the clerical staff and a lady almoner to following up patients it seems likely that these will yield very valuable statistical material in a few years. An account of the method of following up is instructive.

One of the most successful is the *plastic surgery unit* at St. James Hospital, under Sir Harold Gillies, Mr. T. P. Kilner, and Mr. A. H. McIndoe. During the year ended Dec. 31st, 1935, 274 patients were admitted, some of whom had come from as far as Scotland, Wales, and Devon. The classified list of cases treated shows a great number of operations for facial scars and nasal fractures. Cleft lips and palates also figure largely. Skin grafts of every description have been used, by far the greater number being Thiersch grafts. Interest has been aroused by the promising results obtained in the surgical treatment of active lupus; and it is most encouraging to find that repair of cleft palate in infancy has resulted in such perfect results that the children seen years later are found to speak normally without speech training.

Sir Leonard Hill reports on the *arthritic unit* at St. Stephen's Hospital. A method of treatment is being tried in the rheumatoid type of arthritis which consists in lavage of the joint combined with synovectomy at an early stage of the disease. This gives an opportunity to Mr. Timbrell Fisher and Dr. G. H. Eagles to study early histological changes in the synovial membrane and in the joint fluid. Dr. Claude Elman is investigating the results of gold therapy in the treatment of chronic infective arthritis.

Two *thoracic surgery units* have been established, one at St. Andrew's Hospital and one at St. James Hospital. A great number of operations are being carried out on cases of chronic pulmonary tuberculosis. The operations done included thoracoplasty, phrenic evulsion, thoracoplasty and division of adhesions, and apicolysis. Dr. J. W. Linnell, working at St. Andrew's with the late Mr. H. P. Nelson, also dealt with cases of intrathoracic new growth, lung abscess, and empyema. The only unsatisfactory results reported were in cases of tuberculous empyema and pyopneumothorax. Despite repeated irrigation and aspiration and intercostal drainage in secondarily infected cases, the efforts to prepare them for thoracoplasty have been disappointing. Of 5 cases of chronic non-tuberculous empyema, on the other hand, 3 were complete successes; and of 8 cases of abscess of the lung 6 recovered, and this is, as the authors say, a highly satisfactory proportion in such a serious malady. The importance of good team-work and, in particular, of highly skilled nursing is emphasised by the medical superintendent of St. Andrew's. Mr. A. Tudor Edwards, working with Mr. R. C. Brock and Mr. L. O'Shaughnessy, reports on the second year's work at St. James Hospital. Amongst 153 operations performed there were 27 thoracoplasties and 47 operations for acute empyema and 19 for chronic empyema.

A *goitre clinic* has been in existence at New End Hospital since 1932. Cases are transferred to this clinic from the Council's hospitals and about a third come from outside the L.C.C. area. The patients are encouraged to attend the clinic at intervals after their operations and an effort is made to keep in touch with them by questionnaires. The majority of the 100 patients treated in 1935 were suffering either from primary Graves's disease (40 cases) or from thyrotoxic goitre (46 cases); 104 operations were performed, the majority under a combination of avertin, local infiltration and gas-and-oxygen, and there were no deaths. The consulting staff are Sir Thomas Dunhill, Mr. Geoffrey Keynes, and Dr. Linnell.

Dr. A. F. R. Dewar gives an interesting account of the running of the *diabetic clinic* at St. George-in-the-East Hospital and of the principles observed in the control of glycosuria in patients of different age-groups. The avoidance of the danger of hypoglycæmia in the school-child by the administration

[1] London: P. S. King and Son. L.C.C. No. 3254. Pp. 162. 5s.

daily of insulin in several small doses is considered. In the middle aged—i.e., those whose ages range from 45 to 60—the difficulty has not been so much in control of the main diabetic symptoms as in prevention of degenerative lesions, particularly of the nervous and cardiovascular types. Fibrositis is also an urgent problem. A high blood-sugar is not regarded as the prime factor responsible for these degenerative changes. Dr. B. A. Young, in reporting on the diabetic clinic at St. Peter's Hospital, discusses the relative importance of urine analysis and of blood analysis in controlling the treatment. He says that at his clinic it is the practice to endeavour to keep the blood-sugar within normal limits in younger patients. In the older patients urine analysis is often sufficient. In diagnosis, blood-sugar estimations are, of course, necessary. Self-administration of insulin is taught wherever possible. If the patient cannot be taught, a responsible relative is often available. St. Peter's Hospital have been fortunate in having the coöperation of the East London Nursing Society who have administered insulin and helped in the education of the poorer diabetics. The higher carbohydrate diet combined with the low fat diet advised by Watson and Wharton has been successful in trials at St. George-in-the-East.

A *congenital syphilis unit*, with residential treatment for the children, at St. John's Hospital is under the supervision of Dr. David Nabarro. Twelve new cases have been admitted during the year, 9 boys and 3 girls, and there were 11 readmissions, all girls. Dr. Nabarro reports that the progress made by the children is good and fully justifies the provision of residential accommodation. His only regret is that so few of the admissions are of infants under the age of 2–3 months, for it is when started at this early age that treatment is most likely to result in cure. Even better results are obtained by treatment of expectant mothers.

The *urological unit* at St. Mary Abbots Hospital comprises two wards, male (28 beds) and female (25 beds). Under the auspices of the Medical Research Council the effect of Hombreol on prostatism is being studied. The number of cases has been small owing to the fact that before any research can be carried out the patients must be free from urinary infection. It is stated that the results as far as can be ascertained have not been satisfactory. A follow-up department has been established for prostatectomies and stricture cases; patients from other hospitals may attend this clinic for dilatations. A total of 165 operations were performed during 1935, and the report of the medical superintendent, Mr. James Carver, shows that a great variety of genito-urinary diseases are dealt with. Curiously enough, amongst 248 admissions there were only 2 cases of tuberculosis of the kidney and none of tuberculosis of the testis. Urinary infection accounts for 83 admissions, stricture of the urethra for 18, and enlargement of the prostate for 26. The other cases cover a wide field.

Mr. D. A. Beattie reports on the *fracture clinic* at Fulham Hospital. He emphasises the importance of segregation of these cases on admission to hospital. The two wards available at Fulham are equipped with special power points for the use of portable X ray plant and with fracture-beds of the Meurice Sinclair type, that can be tilted by means of pulleys fixed to the ceiling. By collecting the cases in one ward the training of the nursing staff is made much easier and more efficient. In treatment of out-patients ambulatory plaster methods are employed, and every fracture case that has been treated in hospital attends. The senior member of the massage department is always present to ensure the closest possible coöperation between the surgeons and the masseuses. The records are kept in a filing system that renders them easily accessible at any time. The patient's notes are filed with the X rays in one envelope inscribed with his name and number. A viewing-box forms part of the equipment. The average number of patients attending the weekly sessions of the clinic vary between 38 and 45. In addition to fracture cases, all orthopædic patients of the out-patient type and any out-patients referred for massage treatment are kept under observation at the clinic.

UNITED STATES OF AMERICA

(FROM AN OCCASIONAL CORRESPONDENT)

THE American Foundation Studies in Government published on April 5th its report on medical care in the United States.[1] This report is significant both as a contribution to the science of government and as a presentation of the serious thought of the profession most concerned upon the urgent social problem of providing "adequate" medical care to the people. The work of organisation, of review, and of compilation involved in this study must have been tremendous. Wealth alone could not have accomplished it. The Foundation has been well served by research workers with both imagination and ability.

The report is based on some 5000 letters from more than 2000 carefully selected physicians located in all parts of this country. It represents the views of individuals rather than of organisations. At the same time anonymity has been preserved in order that the facts and arguments presented may stand on their own authority. The reader is obliged to rely upon the Foundation for the verification of statements, but he will probably be willing to do so both on account of their general reputation and the evident competence displayed in the preparation of this report. English readers may find it difficult to appreciate how greatly American readers might be affected by the publication of names in this very controversial discussion.

This study does not "prove" anything. It was not intended to do so. What it must do is to promote thought, broaden understanding, and dissolve prejudice. Incidentally it will be a "source" book for sociologists and serious students of government in universities all over the world. For the problems with which it deals are by no means peculiar to these United States.

SCOTLAND

(FROM OUR OWN CORRESPONDENT)

DISCOVERER OF ETHER ANÆSTHESIA

A MEMORIAL to Crawford Williamson Long, American discoverer of ether anæsthesia, was unveiled in the library of the Royal College of Surgeons, Edinburgh, last week. The memorial is a plaque which has been presented by the Southern Society of Clinical Surgeons, U.S.A., in appreciation of their reception in Edinburgh during their visit in 1936. Dr. Long (1815–78) made his discovery at Jefferson,

[1] American Medicine: Expert Testimony Out of Court. The American Foundation Studies in Government, 565, Fifth-avenue, New York City. 1937. Pp. 1500 (2 vols.). $3.50 for both volumes.

Georgia, on March 30th, 1842. Mr. L. B. Wevill, F.R.C.S.E., who was introduced by the president of the College, pointed out that this remarkable discovery was made by an unknown young general practitioner working in a small country town. The effect of inhaling nitrous oxide or ether was at the time used by itinerant chemists to cause amusement. Long observed that during these frolics the subjects of the experiment did not complain of pain when they injured themselves. He therefore proposed to a certain Mr. Venable, one of his patients, who required to have a wen removed, that here might be a way to have the operation done painlessly. On March 30th, 1842, this experiment was carried out with complete success.

POST-GRADUATE TEACHING

The syllabus for post-graduate teaching in Edinburgh has just been published. Apart from the usual summer courses, arrangements are being made for an intensive eight weeks' medical course to be held next autumn. There will be four hours of coördinated teaching each day during the course and special facilities for the study of clinical methods and ward work.

IRELAND

(FROM OUR OWN CORRESPONDENT)

MEDICAL ATTENDANCE ON THE CIVIC GUARD

A FEW weeks ago Mr. Ruttledge, Minister for Justice, received a deputation from the Council of the Irish Free State Medical Union to hear their views on the method ordinarily employed for the appointment and remuneration of medical attendants to the Garda Siochana in country districts. It was pointed out to the Minister that when a vacancy occurred in the position of medical attendant to the Garda it had become the custom for an officer of the Force to invite the medical practitioners in the neighbourhood to tender for the post, stating the fees they would be willing to accept for the several services rendered. The practitioner who was willing to accept the smallest fees was usually appointed. The Minister, without admitting that the deciding point was the size of the fees demanded, recognised that the present method was unsatisfactory, and promised to endeavour to alter it. The matter was raised again in the Dáil last week in the debate on the estimates by Dr. R. J. Rowlette, who had called attention to it previously two years ago. He also commented on the fact that the State did not supply a full medical attendance to members of the Garda, but only what might be called a "general practitioner" service. If a guard had to seek the advice of a specialist or to enter hospital he must do so at his own expense. He suggested that a guard should not be in a worse position than a soldier as regards the care of his health by the State. There should be an efficient medical service provided by the State for its servants. The Minister, in reply, stated that the question of remuneration was the subject of communication between his Department and the Department of Finance, and he hoped for a satisfactory result.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Comdr. R. L. G. Proctor to *President* for course.

Surg. Comdrs. J. S. Elliot and L. S. Goss, O.B.E., retire at own request with rank of Surg. Capts.

Surg. Lt.-Comdrs. T. W. Froggatt to *St. Angelo* for R.N. Hosp., Malta; J. J. Keevil to *Leander* and lent to N.Z. Division for three years; and E. J. Mockler to *Ganges*.

Surg. Lts. W. W. Simkins to *Furious*; and T. McCarthy to *Drake* for R.N.B., and to *Centurion* (on commg.).

Surg. Lts. for Short Service: G. L. Hardman (St. George's Hosp.), J. F. Meynell and W. S. Parker (Manchester Univ.), and W. B. Teasey (Queen's Univ., Belfast).

Surg. Lts. (D) H. Bradley-Watson to *Pembroke* for R.M. Infirmary, Deal; and S. R. Wallis to *Royal Sovereign*.

W. G. Smith and E. B. Mackenzie to be Surg. Lts. (D).

ROYAL NAVAL VOLUNTEER RESERVE

Surg. Lts. F. T. Land, promoted to Surg. Lt.-Comdr., and G. C. Martin, transferred from List 1 of the Mersey Division to List 2 of the London Division.

Proby. Surg. Lt. J. K. Sargentson to *Ramillies*.

ARMY MEDICAL SERVICES

The War Office announces that Col. G. G. Tabuteau, D.S.O., late R.A.M.C., has been promoted to the rank of Major-General with effect from April 1st, and will continue in his present appointment as Deputy Director of Medical Services, Northern Command.

Major-General Tabuteau received his medical education at the Royal College of Physicians and Surgeons, Dublin, and entered the R.A.M.C. in 1905. He was promoted Lt.-Col. in 1928, Brevet.-Col. in 1932, and Col. in 1934. He served in France and Belgium during the Great War, and in addition to receiving the D.S.O. was twice mentioned in dispatches. He also served in Waziristan (1921–24) and in Burma (1930–32), being mentioned in dispatches for the latter service and receiving the brevet rank of Col.

Maj.-Gen. FitzG. G. FitzGerald, C.B., D.S.O., K.H.S., late R.A.M.C., is placed on half-pay under the provisions of Art. 500, Royal Warrant for Pay and Promotion, 1931.

Col. A. Dawson, O.B.E., late R.A.M.C., retires on ret. pay.

Lt.-Col. H. Gall, from R.A.M.C., to be Col.

Lt.-Col. A. N. R. McNeill, D.S.O., from R.A.M.C., to be Col.

ROYAL ARMY MEDICAL CORPS

Majs. to be Lt.-Cols.: R. H. Alexander, M.C., R. W. Galloway, D.S.O., W. Frier, and F. G. Flood, M.C.

REGULAR ARMY RESERVE OF OFFICERS

Maj. C. M. Rigby, having attained the age-limit of liability to recall, ceases to belong to the Res. of Off.

SUPPLEMENTARY RESERVE OF OFFICERS

Lt. R. L. Walmsley to be Capt.

ARMY DENTAL CORPS

Maj. J. H. W. Fitzgerald, having attained the age for retirement, is placed on ret. pay.

Short Service Commissions.—Lts. to be Capts.: R. Walker, D. V. Taylor, and D. S. Wilson.

ROYAL AIR FORCE

Wing Comdr. B. F. Haythornthwaite to R.A.F. Station, Calshot, for duty as Medical Officer.

Squadron Leader C. G. J. Nicolls to R.A.F. Station, Gosport, for duty as Medical Officer.

Flight Lt. O. S. M. Williams to Princess Mary's R.A.F. Hosp., Halton.

Flying Offr. R. F. Courtin to R.A.F. Depôt, Uxbridge.

DEATHS IN THE SERVICES

The death occurred on March 14th at Southsea of Lieut.-Colonel ROBERT GALE, D.S.O., R.A.M.C., retired. Born in August, 1887, he was a son of the late Mr. Parnell Gale and was educated at Glasgow University and graduated M.B., Ch.B. Glasg. in 1909. He entered the R.A.M.C. in the same year, became captain in 1913, and major in 1921. From 1911 to 1914 he was in civil employment in Egypt, and then served during the European war to 1918, being mentioned thrice in dispatches and created D.S.O. in 1915. In 1934 he was Deputy Assistant Director of Medical Services, Northern Command, at York. In 1915 he married Lora, daughter of the late Mr. R. F. Alexander of Glasgow, and leaves a son and daughter.

GRAINS AND SCRUPLES

Under this heading appear week by week the unfettered thoughts of doctors in various occupations. Each contributor is responsible for the section for a month; his name can be seen later in the half-yearly index.

FROM A TADDYGADDY

II

"*Of his works there is no end. . . .*" The man who wrote that was thinking of us as we were more than two thousand years ago: the ordinary plodding day in day out G.P.s of his time. We don't seem to have changed much. We still are slaves of the night bell and the inconsiderate friends of the patient who never think of sending till after hours. He was an observant chronicler. Did he not go on . . . ? "*From him is peace over all the earth. . . .*"

Our remote predecessors knew enough to carry with them always a few opium pills, or their equivalent, so that, once disturbed, they would not get a second message on the same night from the same restless patient. Yet was he thinking merely of the comfort, or discomfort, of the doctor? Assuredly not. That writer, Jeshua Ben-Sira, thought many wise thoughts and, fortunately, wrote them down. When he wrote about us and peace he was thinking—can we doubt it?—of the part other wise men might take in ensuring it. Is it arrogant if we, the doctors of to-day, claim to be numbered with the wise? We may not have any very great store of book-learning—in our student days we were compelled to the study of books that were hardly books at all in the proper sense; but if we are not wise it surely is our own fault. We are thrown, whether we like it or not, into the intimate company of men and women of all sorts. If we do not learn wisdom from them we shall learn it nowhere.

* * *

"*From him is peace. . . .*" Why not? The statesmen talk of war and preparations for war. That way come death and destruction. We are doctors. Our job is the prevention of death, when possible: the alleviation of suffering. Actually we are, or should be, at variance with the statesmen in so far as they consider war inevitable. But are we? And now, somebody will say, I am becoming political. Maybe. But I am content to walk with Ben-Sira. He also was political; but he knew how to write. And he was always on the side of righteousness. Somehow I cannot help feeling that if we doctors would we could do a vast deal in the direction of fostering world peace. In our time we have seen so much of the *personal* effects of war. Potentates pay ceremonial visits to hospitals where they are shown the more presentable cases and say the appropriate things. We see the men who, owing to the activities of flying bits of jagged hot metal, or of noxious gases, are no longer capable of controlling their more unpleasant functions. We know, from personal observation, that war means something even more horrifying than a patch of country littered with corpses: it means here and there an assembly of men, still alive, but no longer men as men were meant to be. Do the statesmen—it matters little whether they are, or are not, dictators—ever think of those half-men?

* * *

What about that old time sentence, "From him is peace over all the earth?" Has it any meaning for us? We, do not let us forget this, are members of a corporation that is international as no other corporation except the Catholic church is international. To a doctor any other doctor is as he is—just a doctor. We have no secrets we will not share. If you or I, English doctors, happen to stumble on something that will help matters in the struggle with—shall we say, the common domestic cold in the head?—we pass it along as quickly as the postal authorities will permit to the uttermost parts of the earth. We are no more respecters of narrow nationalism than were the wandering scholars of the days of faith. They tramped from university to university, from monastery to monastery, from bishop's palace to bishop's palace, swapping manuscripts, gossip, and ideas. So is it with us, with this exception—we do not have to tramp. And yet, in spite of all our heaven-given opportunities, we are content to let our power run to waste.

* * *

It was another Hebrew who wrote: "Wisdom went forth to make her dwelling-place among the children of men, and found no dwelling-place. Wisdom returned to her place, and took her seat among the angels." It is not surprising that he wrote thus. Between his time and the time of Ben-Sira his country had been a battlefield for a couple of hundred years. Ben-Sira had looked forward. That later writer looked back. And we . . . in what direction do we look—we, the doctors of this much later age?

* * *

My working life has been spent in and about back streets; and long before it began I wandered in and out of the homes of the poor with my father, who was essentially a poor man's parson. As a child I numbered many old women among my friends. There was one who lived in a single room with a parrot and, during the proper season, a great cardboard box in which silkworms grew fat on a diet of lettuce leaves until they shut themselves up in cunningly spun prisons of gleaming silk. She and I shared a secret hope—that some day we should gather a pound of yellow silk thread, for then we should be paid a whole sovereign. We never did. Once I found that old woman in a state of dire distress. She had upset her cardboard box, and the silkworms were loose in her bed. However, I collected them for her and all was well. There was another old woman who had as sole companion a bantam hen. She used to give me bantam's eggs which were served up for my breakfast in a wooden egg-cup decorated with a picture of the Crystal Palace given me by another old woman. And this very evening an old woman, very poor: she lives in a single room in an alms-house—has come to see me because she has a sore-throat. That is unusual. As a rule when she comes it is to press upon me a bottle of home-made wine of her own brewing. And the point of all that personal chronicle is just this, that all these old women were friendly. They asked no more than that they might be at peace with everybody else. And is it not so generally? In back streets people quarrel one with another. There are family feuds. But let trouble happen along—the feuds are forgotten, are put on one side. Mrs. Jones will sit up all night with her enemy Mrs. Smith, and

then go off to her work next morning without turning a hair. Forty years in and about back streets have shown me something of the inherent friendliness of people.

* * *

Is it surprising that I, an ordinary average G.P., a Taddygaddy, fail entirely to understand why it is the statesmen seem to think war inevitable? I have gone about my business for many years in quarters that were terribly overcrowded, but very seldom have I heard any suggestion from the people living there that they shall go and seize by force more roomy quarters. The governing people of Europe would be horrified if the common people did that. Yet they have no hesitation in doing it themselves. They call it "expansion." In furtherance of their policy they employ any sort of devilish device that comes to hand. They burn and blister and blow up any who have the temerity to get in their way, and leave us to do what we can in the way of repair. We can do something for the burned and the blistered, but those effectively blown up are beyond our power to help.

* * *

World politics, to every experienced Taddygaddy, must seem entirely mad. The one remedy that may, even yet, be effectual is ridicule. The statesmen of Europe seem to have forgotten how to laugh. But we have not forgotten. A Taddygaddy, an ordinary G.P., who has forgotten how to laugh is no longer a Taddygaddy. He has become no more than a medical man—a tradesman hawking his wares in hope of profit: just that, and no more than that. We have not arrived there yet. We still are a profession that takes no heed of national boundaries. To us it matters not at all whether another doctor be French, or German, or Jap, or English. We do not ask a sick man to produce his passport before we offer our services. All we ask of the foreign doctor is that he shall help: of the foreign patient that he shall accept.

* * *

We have our ideals. They are, very largely, the ideals of the mediæval church which took small stock of narrow nationalism, preaching—even when it did not practise—international brotherhood. The church had this, at least, a common language. The clerk, wherever he went, could talk to fellow-clerk. That made for international unity, so far as the clerks were concerned. We, the doctors of the world, may go further if we will. We have no common language, unfortunately. We no longer express ourselves in Latin, as did that great pathologist, Shattock, not so long ago. But we have this in common with all doctors—sympathy of aim. Cannot we urge that upon the politicians? They might . . . they *might*, see what it is we are getting at.

PANEL AND CONTRACT PRACTICE

Black-coated Workers

THE text of the Widows', Orphans', and Old Age Contributory Pensions (Voluntary Contributors) Bill, 1937, was issued on March 23rd. Health and pensions insurance have been so interlocked hitherto that it is not surprising that some practitioners have wondered whether the Bill may bring into medical benefit persons who have previously been excluded. This is not so. The purpose of the Bill is simply to extend the benefits of voluntary insurance for widows', orphans', and old age pensions to persons with small incomes, whether working on their own account or not, who have not the qualification of insurable employment required under the present scheme. The persons now rendered eligible for pensions will include ministers of religion, shop-keepers, farmers, dressmakers, and music teachers. Its provisions will give them no claim for medical, sickness, or disablement benefit. The scheme not being compulsory the full pension will be dependent upon the payment of a certain number of contributions; if the average falls below that number the rates of pension (normally those provided under the Contributory Pensions Act of 1936) will be reduced. Applicants for admission to insurance must have been resident in Great Britain for at least ten years; their income at the time of application must not exceed £400 a year for men, £250 for women, and in either case up to half may be unearned. For the first year applicants not exceeding 55 years of age at the commencement of the scheme will be admitted, at 1*s.* 3*d.* per week if insured for all benefits or 10*d.* a week for widows' and orphans' pensions only. Women initial entrants will be insured for old age and orphans' pensions for 6*d.* a week. After the first year applicants must not be more than 40 years of age at the date of application and their contributions will vary in accordance with their age at entry. The main qualifying conditions for a pension are as follows.

For a widow's or orphan's pension.—104 weeks of insurance and payment of 104 contributions since the date of entry into insurance.

For an old age pension.—Continuous insurance for at least ten years immediately prior to attainment of the age of 65, and payment of 260 weekly contributions.

Full pensions will be paid only if there is an average of at least 50 weekly contributions per annum throughout insurance.

Mixed Partnerships

Dr. A. resigned from an insurance committee's list in the hope of securing an appointment as head of a department for psychological treatment, to which his having an insurance practice would have been a bar. He transferred his insured patients to another member of his firm, two of whom were under agreement with the committee. Dr. A. wished to attend insured persons on behalf of his partners but the committee were of opinion that it is undesirable for the partner of an insurance practitioner not to be under contract to treat insured persons, inasmuch as misunderstandings and abuses might arise from the treatment of insured persons by a non-insurance practitioner. The committee made a further point: his partners might call Dr. A. in as consultant, when he was not the best specialist for the purpose, because his fees would form part of the firm's income. The matter was referred to the Ministry of Health which replied thus:

"... the Minister of Health is advised that there is no legal objection to the partner of an insurance practitioner not being under contract with the insurance committee, and the Minister has no information which would lead to the conclusion that such a partnership is undesirable as tending to lead to misunderstanding and abuse .... the Minister sees no ground on which exception could be taken to the giving of treatment outside scope by the non-insurance partner .... if an insurance practitioner refers one of his patients to his non-insurance partner for treatment outside the scope of an insurance practitioner's obligations ... no case could lie against

him unless it were shown that he had not faithfully discharged his duties . . . if the non-insurance partner had the necessary qualifications for undertaking the treatment, the fact that some other practitioner might be better qualified would not necessarily indicate non-compliance . . . with the requirements of Clause 9 (1)."

The Insurance Acts Committee has recently had under consideration a communication from a provincial panel committee raising the question of partnership between a practitioner who is doing insurance work and one who is not. The question had arisen because of a suggestion from the insurance committee concerned that the partner with the private practice only should agree not to charge fees to his partner's insured patients. In 1934 the annual panel conference referred to the I.A.C. a motion by Lancashire in the following terms:

"That in the opinion of this conference an arrangement whereby an insurance practitioner has any partnership with a doctor who is not on the medical list is prejudicial to the observance of the regulations governing insurance practice and must of necessity conduce to abuses in the matter of receipt of fees by insurance practitioners from patients on their lists."

The I.A.C.'s view was that any abuses which could be attributed to such a partnership occurred so seldom as not to demand a special regulation, and the 1935 conference concurred in this view.

PUBLIC HEALTH

1936 in Scotland

DETERIORATION rather than improvement in the health of Scotland during 1936 is shown by the report of the Department of Health just issued. The infantile mortality-rate rose from 77 in 1935 to 82, which compares very unfavourably with England's rates (57 and 59 respectively). Maternal mortality fell from 6·3 to 5·6 per 1000 live births, but even the latter rate is higher than it ought to be. The slight rise in the general death-rate, from 13·2 to 13·4, and the slighter increase in tuberculosis mortality can be put down to epidemic prevalence of influenza. The history of infectious disease in Scotland in 1936 was not sensational, though the biennial epidemic of measles was sharper than usual; there was an unusual amount of poliomyelitis in autumn in south-east Scotland, and several small outbreaks of paratyphoid occurred, especially in the west. As in the rest of Britain and most parts of Europe, diarrhœal diseases (including the typhoid and dysentery groups) were more prevalent in 1936 than for many years.

The Scottish Office provides an annual report on the health of insured persons, which is the most reliable of the meagre reports on morbidity available. We read that it is "disappointing that the completion of a quarter of a century of National Health Insurance leaves the incidence of incapacitating sickness so high . . . at eleven days per insured person per annum and the figure is not declining." But in two places attention is called to the higher standard of health demanded, which causes employees to go off work earlier and more frequently and to return to work later than they did in the past. To what extent this leads to better health is one of the chief medico-social problems before us at present. Attention is called to the increase in chronic incapacity not attributable to the increased age of the population and an alleged increase in deaths from rheumatic heart disease amongst the young. "Year after year at least 1000 lives are lost from this type of heart mischief in Scotland." Housing in Scotland is notoriously bad, but it is astonishing to read that overcrowding is six times as common as it is in England. The paragraph on housing gives the impression that the Department attributes much of the avoidable ill health of Scotland to bad housing.

A chapter on food-supply opens by describing a milk-feeding experiment on school-children in England and Scotland. A third of the children were given daily a third of a pint of pasteurised milk, another third were given two-thirds of a pint of pasteurised milk, and the remaining third were given two-thirds of a pint of raw milk. No difference was detected between the pasteurised and raw-milk groups, but the two-thirds pint children did better than the one-third pint. The milk-in-schools scheme, similar in Scotland to what it is in England, is having the same history. After the first spurt there was a big reduction in the numbers of school-children paying for the milk, though recently the tide has turned and there is a slight increase. The reasons assigned for what must be considered a partial failure of the scheme can be divided into excuses that should be ignored and grievances that should be remedied. The latter are three in number: novelty worn off; mid-morning milk spoils the appetite for dinner; parents resent paying for what some can obtain free. The first is the most important. The milk-in-schools scheme was introduced to foster the habit of milk-drinking, but so far its success in that direction has been poor, for the habits of the people are not to be changed in a few months. It is necessary to make the milk-in-school a more intimate part of education if it is to engender a permanent habit of milk-drinking. If eleven-o'clock milk were called an aperitif instead of a milk ration it might increase and not diminish appetite for the midday meal! In any case the drink can be retimed. From Dundee comes the admirable suggestion to give the ration between 9 and 10 o'clock because "it would be of benefit to such children as had had only a scanty breakfast." There is general agreement that a third of a pint of milk is insufficient, and a growing tendency to give more of it free.

An Epidemic and the Public

In the late summer of last year there was an outbreak of typhoid fever in the Bournemouth district in the course of which 523 cases were notified to the sanitary authorities of Bournemouth, Poole, and Christchurch, and 41 deaths occurred. Complaint was made in the local press against the local authorities that they had not taken the public into their confidence at a sufficiently early stage. There was in fact a suggestion that an endeavour had been made to conceal from the public the true facts about the outbreak. At the request of all the parties concerned, Judge Cotes-Preedy held a private inquiry, the report of which was issued on Tuesday. In his view, once the situation was established, there was no endeavour on the part of the authorities to conceal the true facts about it; he thought the officials would have acted unwisely if they had sponsored the announcement in the press of an existing epidemic directly suspected cases had appeared. It was common knowledge, he remarks, that sporadic cases of typhoid frequently occur and the difficulty of diagnosis called for caution, if only for the reason that a hasty announcement might determine the flight of people carrying the disease to all parts of the country.

CORRESPONDENCE

OVER-TREATMENT OF GONORRHŒA

To the Editor of THE LANCET

SIR,—I beg to endorse the views given by Mr. Nicholls in your issue of March 20th, writing as one who has lived in that dark and uncritical world to which he refers, having held posts in venereal disease clinics for over twenty years.

I gave evidence before a subcommittee of a V.D. hospital more than two years ago, and directed attention to some of the points raised by him, but do not know with what result. If the total number of attendances rather than the total number of patients is to be regarded as a criterion of good work, and monetary grants are apportioned accordingly, this system appears to call for the most searching investigation.

Among various types of cases which occur to my mind are those that are treated regularly over long periods by prostatic massage and posterior irrigations, usually carried out by orderlies. In a large proportion of these cases the patient complains only of a slight morning urethral moisture, and notices threads in the urine; cultures and films continually taken show only diphtheroid bacilli and staphylococci, the prostate exhibits no gross abnormality, and the urethra appears normal on urethroscopy. Why are these cases condemned to protracted treatment, with the risk of disastrous psychological reactions? Again, irritation of the prostate by posterior irrigations and massage during the early weeks of gonorrhœa is, in my opinion, mainly responsible for the cases of acute prostatitis and epididymitis that are so frequently recorded. A prostate treated with respect and consideration will, as a rule, give no serious trouble in the course of the disease. All experience goes to show that the efficiency of any V.D. clinic depends in great measure upon systematic liaison with various departments of a hospital, of which the genito-urinary one is manifestly interdependent.

As Mr. Nicholls points out, it is difficult to understand why gonorrhœa should be "wedded to syphilis" and why an expert knowledge of either disease provides any guarantee whatever of a like standard of efficiency in dealing with the other. It seems obvious that the syphilis department of a V.D. clinic should be divorced from the gonorrhœal one; the director of the former having special experience in dermatology, cardiology, and neurology, and that of the latter in genito-urinary surgery and gynæcology.

Procedure in regard to the segregation of V.D. cases from others is another matter which demands urgent attention. For example, the psychological effects on a man suffering from a non-gonococcal urethritis and prostatitis (now recognised as a common condition) when condemned to make use of the same cubicle and apparatus as a V.D. patient can be left to the imagination. The female V.D. department is, in my opinion, in still greater need of reorganisation. My experience has convinced me that this part of the clinic tends to become a "sifting" department for a variety of conditions—such as laceration of the cervix following childbirth, prolapse, and mycotic diseases of the vulva and vagina—owing to the fact that, under the present system, a patient complaining either of vaginal discharge and irritation, or of painful and frequent micturition, is customarily referred to a V.D. department. This procedure, I submit, not only involves a total disregard of the patients' feelings but also makes them reluctant to seek advice.

Some twenty years have elapsed since an inquiry relating to venereal disease was last held in this country. In view of the fact that the London County Council are to expend no less than £55,000 on V.D. clinics in London during the coming year, it seems reasonable to suggest that the time has now arrived for the holding of another inquiry for the purpose of assuring the public that the organisation of these clinics is such that the money provided is being expended in the best interests of public health.

I am, Sir, yours faithfully,

A. MALCOLM SIMPSON.

Wimpole-street, W., April 5th.

WHO INVENTED THE IDEA OF TARRING ROADS?

To the Editor of THE LANCET

SIR,—In reply to the query raised by "A Rusticating Pathologist" in Grains and Scruples of March 20th, the tarring of roads would seem to have been invented by Sin and Death when they thus treated their causeway across Chaos from Hell to the newly created World ("Paradise Lost," Bk. X). The work of consolidating the materials with asphaltic slime appears mainly to have been done by Death, which suggests that the alleged increase of cancer of the lungs in recent times may perhaps be due, not to the dusty roads of thirty years ago, but to the widespread use since then of so notorious a carcinogenic substance as tar.

I am, Sir, yours faithfully,

New College, Oxford, April 2nd. R. S. CREED.

To the Editor of THE LANCET

SIR,—In your issue of March 20th "A Rusticating Pathologist" begins his article with the statement: "No one that I have asked has been able to tell me who invented the idea of tarring roads. It was a great discovery, worth a peerage and a fortune as well as the preservation of a name. . . ." It may interest you to learn that it was Dr. Guglielminetti, a Swiss by origin born in Monthey (Valais), who in 1900 in Montecarlo made the first experiments with tarring roads. As a doctor he was greatly impressed by the dust nuisance and this led him to his discovery. In the French automobile press Dr. Guglielminetti has been appraised as *le père goudron*.

I am, Sir, yours faithfully,

Basel, March 31st. A. L. VISCHER.

ATHLETICS FOR WOMEN

To the Editor of THE LANCET

SIR,—Your reviewer (March 27th, p. 760) of the "British Encyclopædia of Medical Practice" dislikes my (apparently) old-fashioned prejudice against violent exercise for women. Any such objections proceed from a variety of reasons: some perhaps merely a matter of taste, some affording legitimate scope for difference of opinion. It may be true, as your reviewer submits, that a large number of women condemned to childlessness seek an outlet for their energies in athletics, although one may speculate whether some preferable form of sublimation might not be selected. But when he adds that my (presumed) contention that the habit of taking strenuous exercise makes for difficult labour is quite unsupported by evidence, he implies that he has

the unanimous support of obstetricians and gynæcologists. A considerable number of eminent obstetricians have assured me that they are fully convinced of the disadvantageous influence of violent and strenuous exercise from their point of view. From my point of view there are other direct and indirect consequences of the strain of intense competition against which I particularly inveigh.

I am, Sir, yours faithfully,

Brook-street, W., March 30th. ADOLPHE ABRAHAMS.

COLOUR PERCEPTION TESTS

To the Editor of THE LANCET

SIR,—In a moderately illuminated spectrum the number of colours seen by different people varies from six to two. The brightest portion of the spectrum is between wave-lengths 57 and 61A, and from there the brightness appears to shade into the dark red and violet constituting as it were two areas of brightness, a central very bright area within a larger bright area. The colours in the former are pale greenish yellow, yellow and orange red, whereas the green and red in the larger area are saturated and distinct.

Trichromics and dichromics confuse red, green, yellow, and white signal lights. The only property common to these colours is brightness and the difference in brightness apparently enables colour-blind persons to differentiate colours from each other. If this is correct, then mistakes should start in the brightest portion of the spectrum in the earlier varieties of colour-blindness and be more and more pronounced till total colour-blindness is reached—and this is exactly what occurs. The trichromic, the first stage of dangerous colour-blindness, when asked to map out the fullest extent of red will stop short of orange and declare he can see yellow (or white), and when asked to do likewise with this colour will map out an area extending from orange red into a yellow-green and declare it to be monochromatic yellow or white, whereas it contains pale red, orange, yellow, and pale green colours. This area corresponds to the brightest portion of the spectrum. He does, however, recognise the more pronounced red and green colours of the spectrum on either side of his monochromatic area. With a lantern examination the same person, if shown similar pale red, green, and yellow colours, will be unable to distinguish them because colours of this saturation and brightness come within his confusion area; but he will not confuse saturated reds and greens which are outside it. This confusion of colour corresponds to the extent of altered colour perception, increasing to a point where it reaches the stage of dichromatism.

Dichromics, when asked to map out the fullest extent of red, will map out an area extending right into blue and consider it red or yellow, and this area will be found to correspond to the larger area of brightness. As this area contains definite red and green colours with a lantern examination, they will mix up saturated red, green, and yellow colours. To the dichromic there is no difference between red and yellow; he is apt to call a yellow-green red. The totally colour-blind see only a bright area of varying shades of intensity. Looking at the full spectrum, dichromics see a white space of varying size between the red and violet.

There is apparently a definite balance between saturation and brightness on which the recognition of colour depends, and if this balance is upset then brightness gets the upper hand, bright red appears as yellow and violet as blue, giving rise to the so-called yellow and blue sensation. There is not really an increased sense towards yellow and blue; these colours merely appear brighter. In all colour perception tests these facts should be borne in mind. When carrying out book tests care must be taken to make the examination in a bright light to bring out the confusion effect; otherwise varying results will be obtained with the same person by different examiners.

I am, Sir, yours faithfully,

C. E. R. NORMAN,
Chief Medical Officer, South Indian Railway.

Trichinopoly, March 13th.

THE ÆTIOLOGY OF PELLAGRA

To the Editor of THE LANCET

SIR,—May I call your attention to an error and a misconception in the report in your issue of April 3rd (p. 811) of my contribution to the discussion on nutrition and its effect on infectious diseases which took place on March 24th at the Royal Society of Medicine. The experiments with pigs referred to were carried out in collaboration with Dr. T. A. Birch, not Bird, and Sir Charles Martin in the department of animal pathology at Cambridge. They were devised to study the nutritive defects of maize in the hope of throwing light on the ætiology of pellagra. On a diet of maize supplemented with pure casein the pigs soon ceased to grow and suffered from diarrhœa. This was apparently due to the combined effect of an intestinal infection and the defective diet, but it was not my intention to convey that the "intestinal condition" resembled that found in human pellagra.

I am, Sir, yours faithfully,

HARRIETTE CHICK.

Lister Institute, London, S.W., April 5th.

IMMUNISATION OF MEN—AND ANIMALS

To the Editor of THE LANCET

SIR,—I read with considerable interest your annotation in last week's number on vaccination against African horse-sickness, and as a Houyhnhnm I was touched by the solicitude shown by your race for the less fortunate members of mine. This concern for the welfare of beings other than themselves has always seemed to me to be one of the traits which argues that the human race will some day emerge from its present state to something like what we Houyhnhnms would call civilisation. My brother, who has always taken a more cynical view than I of human endeavour, made the remark that had the horses been black instead of being of good British blood, African sickness could have done its worst without attracting much attention. But I pointed out to him that at any rate in large-scale commercial undertakings painstaking and praiseworthy efforts are made by the management to prevent tuberculosis and pneumonia from incapacitating or exterminating the native labour force. I had, indeed, been reading your annotator's comments with unqualified gratification until I came to the final paragraphs where after detailing the various dangers and mishaps to horses, which might attend vaccination with neurotropic vaccine, he casually remarked that "these considerations are of minor importance."

So much depends upon the point of view! I confess that both my mane and my tail bristled at your annotator's remark. I could have to some extent understood it had he been referring to the immunisation of human children. I find modern human literature too depressing to read extensively, but from what

little I read and from what I hear from correspondents of my own people in different parts of the world I gather that humankind has definitely made up its mind that it is the State not the individual that matters. Of this I have nothing to say. I am liberal enough to believe that the human species, and even such backward members of it as Russians, Germans, and Italians, know their own business best. But I should like to make it clear that the principle has never been admitted in Houyhnhnm philosophy and to this we are inclined to ascribe the culture, peace, and happiness of our society. So far as horses are concerned it must be allowed that their very origin was in the freedom of the unlimited steppes where the family rather than any larger social caucus was the fundamental unit. To an equine it would never appear a sufficient justification of mass immunisation that some other equine's offspring was saved if it were at the expense of "unfortunate results" of immunisation affecting his own offspring.

It may not be known to your readers that although immunisation methods have been introduced to a limited extent among the Houyhnhnms, they are only adopted after certain formal preliminaries. If a case has been made out in the laboratory for the procedure, our doctors are permitted to make trial upon themselves. If this is satisfactory (and there are any doctors left) volunteers who are told exactly how things stand are asked for and inoculated. The results on these are handed over to one of the most responsible officers of our State—the Lord Chief Statistician. With us this dignitary's opinions are as valued, his judgments are as binding, and his jokes as highly appreciated as with your own Lord Chief Justice. If his opinion is unfavourable the perpetrators of the false immunisation are severely punished and this perhaps explains why immunisation has never been so popular with us as with you. If, on the other hand, his opinion is favourable he affixes his seal and the countersign "fiat" (an abbreviation for *fiat experimentum* not for *fiat lex*, as might be expected from human precedent). The fiat, with the relevant data but without further remarks, is then promulgated throughout our Commonwealth and any parents who choose may bring their foals to be injected. There is, of course, no compulsion and that essentially human activity—propaganda—is entirely unknown among us. It is one of the advantages of being a Houyhnhnm that the steppes are wide and grass is cheap, and if we don't like society or its ways we can always lump it.

Mark you, I am not denying the general principles expressed in your annotation. I wish merely to point out that though they may be applicable to many species of beings, including yourselves, they are repugnant to what I would with due modesty call "horse sense." The classical human historian of my people (may his great soul rest in peace!) wrote also, you will remember, a constructive little pamphlet called "A Modest Proposal" for eating Irish children, which it has always seemed to me deals admirably with the human aspect of the case. But you will say that "Ireland isn't England and never was," and although I find myself unable to subscribe to many human opinions, I have, in this instance, to admit that you are probably right.

I am, Sir, yours faithfully,

April 4th. A HOUYHNHNM.

PARLIAMENTARY INTELLIGENCE

NOTES ON CURRENT TOPICS

THE House of Commons reassembled on Tuesday, April 6th, after the Easter recess.

The Special Areas (Amendment) Bill was read a second time.

QUESTION TIME

TUESDAY, APRIL 6TH

The Duties of Coroners

Mr. EDWARDS asked the Home Secretary whether, in view of statements recently made by coroners which seemed to be outside the function of a coroner, he would now consider expediting action on the report of the departmental committee which deplored the tendency of coroners to make animadversions on the character and conduct of individuals.—Sir JOHN SIMON replied: I am not sure what particular statements the hon. Member has in mind, but I fear there is no prospect of an opportunity being found during the present session for any legislation on the subject of coroners. I do not think there is any action which can conveniently be taken meanwhile to deal with particular recommendations included in the committee's report: but I have no doubt coroners have noted the recommendation in the report on the point to which the hon. Member refers.

Viscountess ASTOR: Can the right hon. gentleman assure us that some action will soon be taken? Will he bear in mind that it was because of the action of coroners that the committee was set up and that a good many people are beginning to think that the committee was just so much eye-wash?

Sir JOHN SIMON: I do not think that the hon. Member can take that view. The committee reported earlier in the year. It is not always possible to legislate immediately when a committee reports. But I would certainly agree with the committee in deprecating animadversions unnecessarily made in the course of an inquest which reflect on persons who are not in the court and who have no means of reply.

Recruits Below Standard

Miss WARD asked the Minister of Labour whether he had examined the Aldershot experiment in connexion with recruits below the required standard for acceptance in the Army; and whether he could make use of the satisfactory results in the sphere of unemployed men who were in need of health services.—Mr. ERNEST BROWN replied: The results of the experiment are now being examined by my department with a view to seeing whether they point to the need for any modifications in the treatment of unemployed men applying for a course of training.

Medicine Stamp Duties

Sir ROBERT BIRD asked the Chancellor of the Exchequer (1) whether he was aware of the great anxiety felt by those members of the Pharmaceutical Society engaged in trade over the recommendations in the report of the Select Committee on Medicine Stamp Duties; and whether it was his intention to introduce legislation implementing the recommendations wholly or in part; and (2) what steps he intended to take for terminating the loss to the revenue consequent upon the avoidance of the payment of medicine stamp duties disclosed in the report of the Select Committee on Medicine Stamp Duties.—Mr. CHAMBERLAIN, Chancellor of the Exchequer, replied: I can assure my hon. friend that due weight will be given to all relevant considerations in connexion with the committee's report, but I regret I am unable, at present, to make any further statement on the matter.

CLATTERBRIDGE ISOLATION HOSPITAL.—A new nurses' home and a cubicle block were opened on March 22nd at this hospital by Major Green, chairman of the Wirral Joint Hospital Board. The scheme cost over £14,000 and the nurses' home has accommodation for 26.

OBITUARY

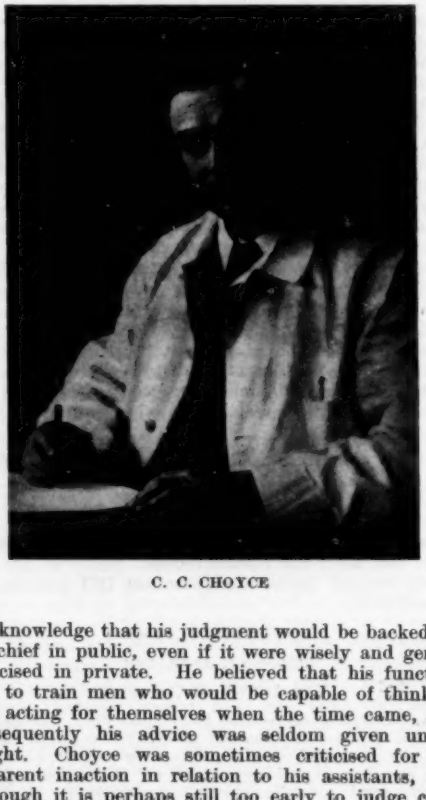
CHARLES COLEY CHOYCE, C.M.G., C.B.E., F.R.C.S.

Prof. Choyce, formerly surgeon to University College Hospital and director of the surgical unit there, died in the hospital on Friday last. He had been ill for a considerable time and had retired from all his professional positions.

Charles Coley Choyce was born in Auckland, New Zealand, and educated at the University of New Zealand, where he graduated as B.Sc. in 1896. He proceeded to Edinburgh for his professional training and graduated in medicine in 1901, proceeding later to the M.D. degree, while in 1905 he obtained the diploma of F.R.C.S. Eng. He held resident appointments at the Leicester Infirmary and the Dreadnought Seamen's Hospital, of which institution he was medical superintendent for three years; later he was surgeon to in-patients at the Albert Dock Hospital and assistant surgeon to the Dreadnought, while he also acted as out-patients' surgeon at the Royal Northern Hospital. At the outbreak of war he was appointed consulting surgeon to the Egyptian Expeditionary Force, with the temporary rank of colonel, A.M.S.; he took charge of a large convalescent hospital for officers, and his services were recognised at the close of the war, when he was made C.B.E. and C.M.G. Shortly afterwards he was appointed professor of surgery in the University of London with the chair at University College, while he became director of the surgical unit at University College Hospital.

We owe to Mr. A. J. Gardham the following appreciation of Prof. Choyce's work and influence: "Prof. Choyce came to University College Hospital in January, 1920, as first director of the surgical unit, a post which he held until his retirement in October, 1935. The post which he was asked to fill was not an easy one: it called for new ideas, for persistence, and for an ability to handle men and things with firmness and tact. All these Choyce had, and by the ungrudging use of them he built up the surgical unit, carried it through its early troubles, and was able, when the time came, to hand it over to his successor as an established institution. It is probably true to say that by the time he came to University College Hospital he felt that his primary interest was in medical education. This interest he followed actively after failing health had curtailed his clinical activities, and it will be as a great teacher and as a charming and courteous personality that Choyce will live in the minds of those who passed through his hands in these years. It was never Choyce's aim to be a figurehead. His contacts with his colleagues and his juniors were essentially personal, and he was perfectly equipped to hold a post which by its very difference from that held by other members of the honorary staff enabled him to act as a connecting link between them. He was never happier than when some surgical or administrative problem led to a friendly meeting of his colleagues in his office. For students he had an almost royal memory, both for faces and character, and it was not for nothing that he was often referred to among them as 'Papa' Choyce. His geniality however was never sufficiently indiscriminate to include the lazy or the inefficient, and his judgment of men was much more penetrating and critical than he allowed it to appear. The student who worked well in the surgical unit wards, however unobtrusively, secured thereby a wise and helpful friend for as long as he had need of him. The shirker, and most particularly the shirker who laid himself out as he thought to attract the favourable attention of the professor, found a stern critic beneath the genial exterior.

"There can be no one who has acted as Choyce's assistant in any capacity who does not wish to praise him as a master. Once an assistant had gained the confidence of the professor he was left to work out his own lines of thought and action, secure in



C. C. CHOYCE

the knowledge that his judgment would be backed by his chief in public, even if it were wisely and gently criticised in private. He believed that his function was to train men who would be capable of thinking and acting for themselves when the time came, and consequently his advice was seldom given unless sought. Choyce was sometimes criticised for his apparent inaction in relation to his assistants, and although it is perhaps still too early to judge completely how wise it was, many of those who learned to seek his advice and profit by it are now independent surgeons and teachers who remember their early training with gratitude.

"Choyce's literary activities are well known wherever surgery is practised and the English language understood. Only one who has shared them to some extent can understand the labour which went into the production and re-editing of 'The System.' Nothing but the best was good enough for this book. Choyce rightly felt it to be the standard by which English surgery is judged in many places where it is read of rather than seen, and he was proud of the responsibility which this threw on his shoulders. Personal surgical experience and knowledge which he had in abundance were useful, but not enough. In addition, he had the faculty, born of a very wide association with the leading men of his time, of knowing where to go for what he needed. This, combined with never-failing tact and

unremitting labour, produced the work of which he was so justly proud. Although it was the best known of his works, 'The System' was by no means the only one, and everything with which he had to deal, either as author or editor, received the same meticulous attention."

Mr. E. K. Martin writes: "When Choyce first came to University College Hospital after the war he was a comparative stranger to its staff and an unknown quantity to the students. The whole-time units were just starting in an artificial atmosphere with determination towards their immediate success and doubt as to their ultimate validity. The men returning from the war regarded the intrusion of women into the school with feelings of heat rather than warmth. In the emotional tension of 1919, and within the limited horizons of a medical school, Choyce was a monument of kindly permanence. He was confident in his ideals and he liked to help his fellow-men. In this sense, 'men' included women, and his encouragement did much to widen the openings available to them in the hospital Sympathy with youth was so natural to him that, within a few years of his joining U.C.H., he became the recognised confidant of anyone who wanted to talk over or seek advice on the current problems of his life. The annual residents' play never omitted a sympathetic caricature of 'Papa' Choyce. On committees he was a counsellor of moderation and a mediator between differences of opinion. His exceptional capacity for the working out of detail has a permanent memorial in several of the recent buildings and reconstructions at U.C.H. This same grasp of detail, combined with wide knowledge and a gentle power of persuading other people to fall in with his plans, made his 'System of Surgery' the most successful text-book of its type in the English language His surgical work was characterised by a wide knowledge of established procedure and a sound judgment of the men whom he had seen at work."

A friend and colleague of 30 years' standing writes: "C. C. Choyce was a man with many friends and no enemies; just the man to edit a System of Surgery, for he could manage his team without the whip; just the man to run a surgical unit, for he had no selfishness, no personal vanity, and no axe to grind. He was a sound surgeon, of good judgment, with no fads or fancies; a sane teacher. His influence on those he taught will spread through the next generation as a healthy leaven."

Throughout most of his time at U.C.H. Prof. Choyce's health precluded much work in the operating theatre, but with characteristic optimism he made of this disability, which he so greatly regretted, an opportunity for the encouragement and education of his successors. The courage and equanimity with which he faced the troubles which ill health threw upon him in his later years was the admiration of all who knew even a part of what these were. He was 61 years of age at the time of his death.

Prof. Choyce married the daughter of Mr. F. C. Dobbin at Chislehurst, who survives him with a daughter and son.

ALEXANDER CORSAR STURROCK, M.D. Edin., M.R.C.P. Lond.

THE death occurred at Eccles, near Manchester, on March 27th of Dr. Alexander Sturrock, consulting physician to the Salford Royal Infirmary, and well known in the neighbourhood as a sound general physician especially well equipped in connexion with mental disease. A son of the late Mr. George Sturrock of Linlithgow, he was educated at the University of Edinburgh, where he took his degree in arts in 1892, secured a Vans Dunlop scholarship, and graduated as M.B., C.M. with first-class honours in 1896. On proceeding to the M.D. degree two years later he obtained the gold medal. Having held resident appointments at the Grimsby Hospital and the Manchester Royal Infirmary, he started in general practice in Eccles, and in 1906 took the diploma of M.R.C.P. Lond. During the war, with a commission in the R.A.M.C., he acted as physician to Sir Henry Norman's hospital at Wimereux; later he served for two years at Salonica, was mentioned in dispatches, and retired with the rank of major. He now engaged in consultant work at Manchester and was appointed physician to the Salford Royal Hospital. Here he displayed his practical interest in mental disease, organising an out-patients' department at Salford in connexion with the county mental hospital at Prestwick.

Dr. Sturrock occupied an important social position, was a county magistrate, and an active politician with Conservative views. He was 65 years of age at the time of his death.

JOSEPH PEREIRA GRAY, M.D. Brux., M.R.C.S.

THE death of Dr. Joseph Pereira Gray, who died on March 13th in his sixty-ninth year, removed a much respected and well-known figure from the city of Exeter, in which he had practised for forty years.

Dr. Gray studied medicine at Charing Cross Hospital, London, and at Brussels, taking the M.R.C.S. Eng., L.R.C.P. Lond. in 1894 and the M.D. degree of the University of Brussels, with honours, in 1903. He was a prominent figure in Exeter public life, holding the appointments of police surgeon, medical officer to the City Hospital and the Exeter Children's Home, medical officer to the Southern Railway, and visitor of Licensed Houses under the Lunacy and Mental Deficiency Acts. He was an honorary surgeon to the Exeter Dispensary for twenty-five years, serving on the committee on numerous occasions, and later being elected consulting surgeon. He was keenly interested in ambulance work, being the first surgeon to the Exeter City Division of the St. John Ambulance, which was founded in 1901, and remained its surgeon for very many years, obtaining the long service medal, and being elected honorary life member, lecturer, and examiner to the St. John Ambulance Association.

A man of untiring energy and with an attractive personality, he had a very large general practice, his chief characteristic being an unfailing kindliness, especially to his poorer patients.

GILBERT COCHRANE, M.B. Glasg.

THE death occurred recently at Birmingham General Hospital of Dr. Gilbert Cochrane, who had been M.O.H. of the Bromsgrove urban district for the last ten years.

He received his medical education at the University of Glasgow where he graduated in medicine in 1923. He held resident appointments at the Staffordshire General Infirmary and the Consumptive Sanatoria, Bridge of Weir, and settled in practice at Bromsgrove in 1926, when he was appointed M.O.H. of the Bromsgrove urban district and medical officer for the Bromsgrove, Droitwich, and Reddich joint isolation hospital. He was also medical officer to the Bromsgrove school and surgeon to the local

cottage hospital. The early termination of Dr. Cochrane's professional career is a distinct loss to Bromsgrove and the district. His colleagues on the staff of the Bromsgrove cottage hospital recognised the soundness of his coöperation there, while his work at the isolation hospital was highly thought of by his authority. As M.O.H. of the enlarged Bromsgrove district his duties were carried out in a conscientious manner and marked by a high standard of efficiency.

GEORGE HERBERT SPENCER, M.R.C.S. Eng.

Dr. G. H. Spencer, who died at his home at Newcastle after a brief illness on March 24th, practised on Tyneside for over thirty years, first at Wallsend and afterwards at Newcastle. Born at Austerfield, near Doncaster, he received his medical training at the London Hospital, and qualified with the English double diplomas in 1900. He held resident appointments at the London Hospital and the Tynemouth Infirmary, and was then appointed surgeon to the Hospital for Sick Children at Newcastle-on-Tyne. Having previously held a commission in the R.A.M.C. (T.A.), he commanded the military hospital at Catterick camp during the war with the rank of lieut.-colonel, R.A.M.C. In the Tyneside he secured by skill and personal popularity a large connexion. He was 67 years of age at the time of his death, and leaves a widow and two children.

MEDICAL NEWS

Royal College of Surgeons of England

On Monday next, April 12th, at 5 P.M., Mr. Philip Wiles will deliver his Hunterian lecture which was postponed. He will speak on postural deformities of the antero-posterior curves of the spine. Two Arris and Gale lectures will be given by Dr. John Beattie at the same hour on Wednesday and Friday, April 14th and 16th. His subject will be the anatomical and physiological relations of the hypothalamus and pituitary gland.

Society of Apothecaries of London

The May examinations for the diploma of the mastery of midwifery will be held on Tuesday, Wednesday, and Thursday, May 18th, 19th, and 20th, instead of on the dates previously announced.

University of Aberdeen

At a graduation ceremony held on March 31st the hon. degree of LL.D. was conferred on Mr. Naughton Dunn, surgeon and lecturer in orthopædic surgery in the University of Birmingham. The diploma in public health was conferred on Robert Fraser and S. T. G. Gray.

University of Dublin

At recent examinations at the School of Physic, Trinity College, the following candidates were successful:—

FINAL MEDICAL EXAMINATION FOR M.B., B.CH., B.A.O.

Part I

Therapeutics and Pathology.—Myer Herman, G. E. Nevill (first-class honours); F. D. F. Steede, Isabella M. Dorman (second-class honours); Thaddeus Fallon, F. H. Counihan, Deborah Bloom, Bernard Kernoff, H. M. Buchanan, M. F. X. Slattery, J. L. Mans, J. W. Cathcart, T. W. Hanna, Jack Morris, Nathan Marks, and Mary Conyngham.

Part II

Medicine.—William Hayes, H. F. Sloan, O. M. Harrison, Sterling Tomlinson, G. K. Donald, R. W. Duncan, C. J. S. Flood, Rebecca M. R. Pike, H. M. Carson, and F. J. B. Convery.

Surgery.—Eileen D. Maunsell, J. G. Steinbock (second-class honours); P. J. Mullaney, Cecil Mushatt, G. C. Retz, D. S. Toole, F. J. B. Convery, J. G. Cunningham, D. J. H. Douglas, P. L. van Aardt, A. J. Reeves, John McQuillan, and Max Levy.

Midwifery.—E. M. Cochrane, G. N. MacFarlane, M. C. Brough, R. E. Taylor, H. J. Walker (first-class honours); W. T. Kenny, J. C. Lambkin, J. E. Gillespie, Stella M. Coen, C. G. Reilly, Charles Cunningham, J. A. Strong, Jasmine Taylor, F. C. Heatley, H. F. T. MacFetridge (second-class honours); M. C. Warnock, F. A. Hanna, A. D. Parsons, Robert Pollock, Jack Freedman, D. G. Harrison, Grace M. Wild, J. N. G. Drury, Patricia M. J. Conway, J. G. Nixon, J. B. Plews, S. G. Heaton, M. C. Wood, J. H. Mitchell, J. R. Steen, Ronald Brass, C. M. Ludlow, and Samuel Rubin.

D.P.H.

Part I.—T. A. Austin, Emily M. Booth, H. W. Dalton, and Mary S. Miller.

D.G.O.

Koppel Tatz, M. M. Kriseman, Amin Wassef, and V. D. Lespinasse.

D.P.M.

Part II.—H. J. Eustace.

University of Sheffield

At recent examinations the following candidates were successful:—

FINAL EXAMINATION FOR M.B., CH.B.

Part II and III.—Margaret G. Bell (with first-class honours); Ronald W. Elliott, Sigmund Schutz, David Shapiro, Ian B. Sneddon (with second-class honours); Sydney R. Adlington, George K. Burton, Harry Cullumbine, Sa'dallah Khalil, Arthur Naylor, Morris J. Pivawer, and George E. Robinson.

Prof. Archibald Young and Dr. J. G. McCutcheon have been appointed deputy lieutenants of the county of the City of Glasgow.

University of Birmingham

Five William Withering lectures on nutrition and nutritional disorders will be given at the University during April and May. The first lecture will be given by Prof. W. N. Haworth, D.Sc., on April 22nd, the next two by Prof. J. C. Drummond, D.Sc., on April 29th and May 6th, and the last two by Prof. L. G. Parsons on May 11th and 13th. All the lectures will be at 4 P.M. in the medical faculty buildings, Edmund-street, and members of the medical profession and students are invited to attend.

Institute of Medical Psychology

Twenty lectures on psycho-physical adaptation will be given at the Institute on Thursdays at 3 P.M. by Dr. Hugh Crichton-Miller and at 4.30 P.M. by Dr. Cedric Shaw from April 22nd to June 24th. Further information may be had from the educational secretary of the Institute, Malet-place, London, W.C.1.

British Health Resorts Association

Next Saturday, April 17th, this association will hold a conference at Skegness. The first discussion will be on Industry and the Health Resort, to be opened by Mr. A. L. Peterson, speaking as an employer, followed by Mr. Ernest Bevin and Dr. L. P. Lockhart. The second will be on Games, Sport, and Sea-bathing in relation to Health, and the speakers will be Sir Kaye Le Fleming, Dr. R. Cove-Smith, and Dame Louise McIlroy. The association, whose secretary is Dr. Alfred Cox, may be addressed at 199, Piccadilly, London, W.1.

St. George's Hospital: a New Psychiatric Department

The treasurers of the hospital have received an anonymous gift of £5000 towards the cost of buildings and equipping a psychiatric department in the new hospital. In a letter accompanying the gift, the donor says, "St. George's Hospital deserves active public support in its decision to establish a large-scale psychiatric clinic. The benefit to patients, staff, and students of making such a clinic part of a general hospital cannot be too strongly stressed."

Mothers' Clinics

The annual Spring Ball in aid of the Mothers' Clinics will be held at Claridge's Hotel on Tuesday, May 18th. Dr. Marie Stopes, founder in 1921 of the Mothers' Clinics, will be chairman, and among other members of the committee and patrons are Mr. Lloyd George, Mrs. Stanley Baldwin, the Duchess of Atholl, Miss Lilian Braithwaite, Dr. Harriette Chick, Lady Bertha Dawkins, and Sir Alfred Knox. The tickets are £2 2s. each, and may be obtained from Dr. Marie Stopes, Norbury Park, Dorking, Surrey; Mrs. Stallard, 108, Whitfield-street, W.1; or from Claridge's Hotel. They cover the cost of the dinner and the buffet, which will be running during the dancing. A cabaret and sideshows have been arranged.

Mr. Philip Franklin has been elected hon. vice-president of the American Institute for the Deaf-Blind.

Auxiliary Royal Army Medical Corps Funds

The annual meeting of the members of the funds will be held at 5.15 P.M. on Friday, April 23rd, at 11, Chandos-street, London, W.

Royal Institution

On Friday, April 16th, at 9 P.M., a lecture will be given at the institution, 21, Albemarle-street, London, W., by Mr. T. Macara, F.I.C., who will speak on science and the conservation of food.

Queen's University Club, London

The spring dinner of this club will be held in the Dorchester Hotel on Thursday, April 22nd. Further information can be obtained from the secretaries, 101, Harley-street, W.1.

University of London Medical Graduates Society

The annual dinner of this society will take place in the new buildings of the University at Bloomsbury, on Thursday, May 6th, at 7.45 P.M. The guests of honour will be Mr. H. L. Eason, Vice-Chancellor of the University, and Mr. W. Girling Ball, dean of the faculty of medicine. The annual general meeting of the society will be held before the dinner at 7 P.M. in the University. The society may be addressed at 11, Chandos-street, W.1.

Ophthalmological Lectures at University of Glasgow

A short course of lectures will be given at 5 P.M. on Tuesdays from April 20th to May 18th at the Tennent Memorial Building, Church-street, Glasgow. The lectures will deal with leading symptoms in ophthalmology and the lecturers will be Prof. A. J. Ballantyne, Dr. Chesar Michaelson, and Dr. John Marshall. All interested are invited.

Preventive Pædiatrics

The Association Internationale de Pédiatrie Préventive, which is the medical section of the Save the Children International Union, has deferred till September its annual conference which was planned to take place in Rome this Easter. The reason is that the International Child Welfare Congress, which was to have met in Rome at Easter, has been postponed to September. The secretary of the association may be addressed at 15, rue Lévrier, Geneva.

National Association for the Prevention of Tuberculosis

The King has consented to become patron, and the Duke of Kent president, of this association, which was founded by King Edward VII, as Prince of Wales, in 1898. The chairman is Sir Robert Philip, who fifty years ago established in Edinburgh the first tuberculosis dispensary in the world.

The twenty-third annual conference of the association will be held in Bristol from July 1st to 3rd. The chief subjects for discussion will be propaganda and publicity methods; preventive institutions with particular reference to open-air schools; and the equipment and activities of a tuberculosis dispensary. Further information may be had from the acting secretary-general of the association, Tavistock House North, Tavistock-square, London, W.C.1.

Fellowship of Medicine and Post-Graduate Medical Association

All-day courses during April and May will be as follows: neurology, at the West End Hospital for Nervous Diseases (April 19th to 24th); proctology at the Gordon Hospital (April 26th to May 1st); and psychological medicine, at the Maudsley Hospital (April 26th to May 29th). Afternoon courses will be given in dermatology at the St. John's Hospital (May 3rd to 29th), and in thoracic surgery at the Brompton Hospital (May 24th to 29th). Week-end courses will be held in infants' diseases at the Infants Hospital, (April 24th and 25th), in cancer at the Royal Cancer Hospital (April 24th and 25th), in chest diseases at the Brompton Hospital (May 8th and 9th), in physical medicine at the St. John Clinic and Institute of Physical Medicine (May 22nd and 23rd), and in children's diseases at the Princess Elizabeth of York Hospital (May 29th and 30th). Further information may be had from the Secretary of the Fellowship, 1, Wimpole-street, W.

A Congress on Hormones

The Journées médicales internationales de Paris will be held from June 26th to 30th under the patronage of the *Revue médicale française*. The subject for discussion will be the biological, clinical, and therapeutic aspects of hormones. Prof. Paul Carnot will preside, and the secretary-general is Dr. Godlewski.

National Institute of Industrial Psychology

After considering what steps should be taken to cope with the increasing work of this institute, the council has appointed Mr. T. G. Rose, M.I.Mech.E., general director. He will collaborate with Dr. C. S. Myers, F.R.S., the principal, who will retain the position held by him since the institute opened 16 years ago. The address is Aldwych House, Aldwych, London, W.C.2.

King's College Hospital

During the evening service at 5.30 P.M. on Sunday, April 18th, a plaque will be unveiled in King's College Hospital chapel to the memory of Dr. Harold Wiltshire, formerly one of the physicians to the hospital. At the same service the endowment of a bed in memory of Mr. Albert Carless, who was actively associated with the medical school and hospital for nearly 40 years, will be offered by his wife. The address will be given by his friend, the Rev. Howard Banister, vicar of Wallington, Surrey.

Progress of Cremation

In the annual report presented to the Cremation Society recently it is stated that whereas ten years ago there were 16 crematoria with 2877 cremations the numbers last year were 33 and 11,289 respectively. The society, whose headquarters are at 23, Nottingham-place, London, W.1, conducts propaganda in favour of cremation and makes arrangements for registration of the desire to be cremated, and for assurance against the cost. The International Cremation Congress is to be held for the first time in England this autumn, meeting in the Guildhall, London, from Sept. 24th to Oct. 2nd. The National Association of Cemetery and Crematorium Superintendents holds its twenty-second annual conference at Torquay from June 28th to July 1st.

Rate Burdens on Hospitals

Emphatic protests against the crushing burden of rates on voluntary hospitals, coupled with appeals from the various institutions for a system of differential rating, were made at the recent annual meetings of the Brighton hospitals. It was stated at the court of governors of the Royal Sussex County Hospital, the largest hospital in the town, that 5*s.* in every £ received in subscriptions had to be paid away in rates, and the other institutions had similar experience in 1936 in proportion to their size. At the annual meeting of one of the hospitals, the mayor defended the position by stating that the law forbade the authorities to do anything in the way of differential rating. Brigadier-General d'A. C. Brownlow, chairman of the governors of the Royal Sussex County Hospital, replied to this statement by giving figures regarding the rating of hospitals in other parts of the country, and asked for an explanation of the difference. He found, he said, that the 1656 beds in Sussex hospitals were valued at an average of £7·13. In the adjoining counties, including Canterbury, Tunbridge Wells, Guildford, Winchester, Portsmouth, and Southampton, 1574 were rated at £3·64 per bed. Further afield, at the large hospitals of Bristol, Birmingham, Hull, Liverpool, and Sheffield, 6995 beds were rated at an average of £1·51. This, the chairman said, showed that some rating authorities had found a way of giving preferential treatment to their voluntary hospitals. Replying to a suggestion that the corporation be asked to return the rates in the form of an annual donation, if it were impossible to reduce the assessment, he said the authorities had power to contribute to hospitals up to 1·3*d.* in the £. The governors had never asked the corporation to make such a donation, and it had never been volunteered. He added that he believed Portsmouth returned the whole of the rates in the form of a grant.

William Julien Courtauld Hospital, Braintree

The maternity ward of this hospital is to be given up and used as a general ward. If £1500 is subscribed by the end of June the president of the hospital, Mr. W. J. Courtauld, will then build a maternity wing to take ten patients.

Kettering Hospital

A scheme has been inaugurated at Kettering to provide hospital treatment for residents earning from £250 to £500 a year who contribute annually from £2 to £3. The sum of £6000 has just been left to the hospital by Miss Walker.

Evesham Hospital

The committee has secured the land which adjoins this hospital to allow of necessary extensions. The work is increasing and a new out-patient department, casualty ward, and ophthalmic clinic are needed. They will only be part of a comprehensive development of the hospital.

Merseyside Hospitals Council

At the annual meeting of this council Lord Cozens-Hardy stated that there are now 300,000 contributors and the voluntary hospitals and institutions received from it £90,000 more than they obtained from the Saturday and Sunday funds before the council was started. It is hoped that with improving trade prospects it may be possible to ask contributors for another penny a week and thus bring the income up to £250,000.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED MARCH 27TH, 1937

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 0; scarlet fever, 1530; diphtheria, 966; enteric fever, 20; pneumonia (primary or influenzal), 1181; puerperal fever, 27; puerperal pyrexia, 99; cerebro-spinal fever, 28; acute poliomyelitis, 3; acute polio-encephalitis, 1; encephalitis lethargica, 7; continued fever, 1 (Salford); dysentery, 14; ophthalmia neonatorum, 95. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on April 2nd was 3345 which included: Scarlet fever, 871; diphtheria, 1011; measles, 41; whooping-cough, 542; puerperal fever, 11 mothers (plus 7 babies); encephalitis lethargica, 282; poliomyelitis, 1. At St. Margaret's Hospital there were 16 babies (plus 7 mothers) with ophthalmia neonatorum.

Deaths.—In 122 great towns, including London, there was no death from small-pox, 1 (0) from enteric fever, 9 (1) from measles, 3 (1) from scarlet fever, 33 (7) from whooping-cough, 27 (3) from diphtheria, 48 (2) from diarrhœa and enteritis under two years, and 98 (17) from influenza. The figures in parentheses are those for London itself.

Derby reported the only death from enteric fever. Hull and Wolverhampton each had two deaths from measles. Fatal cases of whooping-cough were scattered over 19 great towns; Liverpool had 4. Fatal diphtheria was reported from 18 great towns—Birmingham 3, Burnley, Liverpool, Newcastle-on-Tyne, and Wolverhampton each 2.

The number of stillbirths notified during the week was 259 (corresponding to a rate of 43 per 1000 total births), including 40 in London.

Appointments

JORY, PHILIP, M.B. N.Z., F.R.C.S. Eng., Ear, Nose, and Throat Surgeon to the St. John Clinic, London.

KIDD, H. A., F.R.C.S. Eng., Medical Superintendent at the Kingston and District Hospital.

PALIN, ANTHONY, B.M. Oxon., F.R.C.S. Edin., Hon. Assistant Surgeon to the Bristol Eye Hospital.

PAYNE, R. VAUGHAN, M.Chir. Camb., F.R.C.S. Eng., Surgeon to the Maidenhead Hospital.

SMITH, N. ROSS, Ch.M. Sydney, F.R.C.S. Eng., Orthopædic Surgeon to the Royal Victoria and West Hants Hospital, Bournemouth.

WALKER, V. R., M.B. Glasg., D.P.H., Medical Officer of Health for Lowestoft.

WESTERMAN, ARTHUR, M.D. Aberd., Medical Officer to the Mercers' School, Holborn.

Certifying Surgeons under the Factory and Workshop Acts: Dr. P. G. LEVICK (Bungay, Suffolk) and Dr. G. W. MAY (Ware, Hertfordshire).

Vacancies

For further information refer to the advertisement columns

Aylesbury, Royal Buckinghamshire Hosp.—Second Res. M.O., at rate of £150.

Baghdad, Royal College of Medicine.—Prof. of Pathology and Prof. of Bacteriology, each £150 a month.

Bangor, Caernarvonshire and Anglesey Infirmary.—Sen. and Jun. H.S., £150 and £100 respectively.

Barnet, Victoria Cottage Hospital.—Children's Physician. Surgeon. Also Gynæcologist.

Barnsley, Beckett Hosp.—Res. Surg. O., £300.

Barnstaple, North Devon Infirmary.—Res. M.O., at rate of £150.

Bath, Royal United Hosp.—H.S. to Ear, Nose, and Throat Dept., at rate of £150.

Battersea Borough Council's Maternity Hosp., Wandsworth Common, S.W.—Res. M.O., at rate of £150.

Bedford County Hosp.—Second H.S., at rate of £150.

Birmingham, Canwell Hall Babies' Hosp.—Res. M.O., at rate of £250.

Birmingham, Coleshill Hall.—Res. Asst. M.O., £350.

Birmingham, Dudley-road Hospital.—Jun. M.O., at rate of £200.

Birmingham, Maternity and Child Welfare Dept.—Three Temp. M.O.'s, each £10 per week.

Bootle General Hosp.—H.S., at rate of £150.

Bournemouth, Royal National Sanatorium.—Med. Supt., £800. Also Res. Asst. M.O., £200.

Bradford, City Sanatorium, Grassington.—Asst. M.O., £175.

Bradford, Royal Eye and Ear Hospital.—H.S., £180.

Brighton, Royal Alexandra Hosp. for Sick Children.—H.S., £120.

Burton-on-Trent General Infirmary.—H.S., £150.

Cardiff Royal Infirmary.—H.S. to Ophth. Dept., at rate of £80.

Chester, Barrowmore Tuberculosis Sanatorium and Settlement, Great Barrow.—H.P., at rate of £150.

Chesterfield and North Derbyshire Royal Hosp.—H.S. to Ophth. and Ear, Nose, and Throat Dept., at rate of £150.

Chichester, Royal West Sussex Hosp.—Jun. H. S., £125.

Connaught Hosp., Walthamstow.—Cas. O., at rate of £100.

Dudley, Guest Hosp.—Second H.S., £120.

Eastbourne, Princess Alice Hospital.—Res. H.S., £150.

Edgware, Redhill County Hosp.—Asst. Pathologist, £650.

Edinburgh Royal Infirmary.—Jun. Asst. Radiologist, £250.

Glasgow Eye Infirmary.—Res. H.S., £150.

Grimsby and District Hosp.—Jun. H.S., £150.

Guildford, Royal Surrey County Hosp.—Asst. Pathologist, £500.

Hampstead General and N.W. London Hosp., Haverstock Hill, N.W.—H.S., at rate of £100.

Harrogate Clinical Laboratory.—Clinical Pathologist, £450.

Harrogate, Royal Bath Hosp.—Res. M.O., £156.

Hastings, Royal East Sussex Hosp.—Sen. H.S., at rate of £200.

Hertford County Hospital.—Sen. H.S., at rate of £200.

Hosp. for Diseases of the Skin, Blackfriars, S.E.—Pathologist. Also Clin. Assts.

Hosp. for Sick Children, Great Ormond-street, W.C.—Out-patient Med. Reg., £175.

Hove General Hosp.—Jun. Res. M.O., £120.

Huddersfield Royal Infirmary.—Two H.S.'s, each at rate of £150.

Ilford Borough.—Res. M.O. for Maternity Home, £350.

Kettering and District General Hosp.—Res. M.O. and Second Res. M.O., at rate of £175 and £125 respectively.

Lancashire County Council.—Consultant Obstetrician, £1000.

Leigh Infirmary, Lancs.—Jun. Res. H.S., at rate of £150.

Lincoln County Hosp.—Jun. H.S., at rate of £150.

Liverpool Sanatorium, Delamere Forest, Frodsham.—Sen. Asst. to Med. Supt., £350.

London County Council.—Asst. M.O.'s, Grade I, £350. Also Asst. M.O.'s, Grade II, £250.

London Jewish Hosp., Stepney Green, E.—Asst. Anæsthetist, 1½ guineas.

Macclesfield General Infirmary.—Second H.S., at rate of £150.

Manchester, Ancoats Hosp.—Radiological Officer, £300.

Manchester, Baguley Sanatorium.—Res. Jun. Asst. M.O., £250.

Manchester, Booth Hall Hosp. for Children.—Deputy Med. Supt., £550.

Manchester Royal Infirmary, &c.—Travelling Scholarship in Medicine, £300. Also Scholarship in Pathology, £75.

Metropolitan Hosp., Kingsland-road, E.—Sen. and Jun. H.P.'s and H.S.'s. Also Cas. O. and Res. Anæsthetist, each at rate of £100.

Ministry of Health, Whitehall, S.W.—Temp. Serologist, at rate of £850.

National Dental Hosp., Gower-street, W.C.—Hon. Asst. Anæsthetist.

National Temperance Hosp., Hampstead-road, N.W.—H.P., at rate of £100.

Newark General Hosp.—Res. H.S., £175.

Newcastle-upon-Tyne, Royal Victoria Infirmary.—Hon. Surgeon.

Newcastle-on-Tyne, Wooley Sanatorium, near Hexham.—Asst. M.O., £350.

Northwood, Mount Vernon Hosp.—H.S., at rate of £150.

Norwich Isolation Hosp.—Res. M.O., £450.

Norwich, Norfolk and Norwich Hosp.—H.S. to Spec. Depts., £160.

Nottingham General Hosp.—H.S. to Spec. Depts. and Res. Cas. O., each at rate of £150.

Ocean Island, &c., Central Pacific.—Asst. M.O., £500.

Oldham, Boundary Park Municipal Hosp.—Res. A.M.O., at rate of £200.

Plymouth, Prince of Wales's Hosp., Devonport.—Jun. H.S., at rate of £120.

Portsmouth and Southern Counties Eye and Ear Hosp.—H.S. £150.

Portsmouth Royal Hosp.—H.S., at rate of £130.

Princess Beatrice Hospital, Earl's Court, S.W.—Med. Reg., 50 guineas.

Princess Louise Kensington Hosp. for Children, St. Quintin-avenue, W.—Hon. Radiologist.

Queen's Hospital for Children, Hackney-road, E.—H.S., at rate of £100. Also Clin. Asst. for Med. Out-patient Clinics, 5s. per attendance.
Reading, Royal Berkshire Hosp.—H.S., Cas. O., also H.S. to Spec. Depts., each at rate of £150.
Rochester, St. Bartholomew's Hosp.—H.S., at rate of £150.
Rotherham Hosp.—Hon. Anæsthetist.
Royal Chest Hosp., City-road, E.C.—Res. M.O., at rate of £150, also Med. Reg., £50.
Royal College of Physicians, Pall Mall East, S.W.—Prophit Scholar, £400.
Royal Free Hosp., Gray's Inn-road, W.C.—Asst. Physician to Dept. of Physical Medicine. Also Res. Asst. Pathologist, £150.
Royal Naval Medical Service.—M.O.'s.
Royal Northern Hosp., Holloway, N.—H.S., at rate of £70.
Royal Waterloo Hosp. for Children, &c., Waterloo-road, S.E.—Res. Cas. O. and H.P., at rate of £150 and £100 respectively.
Salisbury General Infirmary.—Res. M.O., £250.
Sheffield Children's Hospital.—H.S., at rate of £100.
Sheffield, Jessop Hosp. for Women.—H.S., at rate of £100.
Sheffield Royal Hosp.—Clin. Asst. to Ophth. Dept., £300.
Sheffield University, Dept. of Bacteriology.—Asst. Bacteriologist and Demonstrator, £500.
Shrewsbury, Royal Salop Infirmary.—Res. H.P., at rate of £160.
Stepney Metropolitan Borough.—Deputy and Asst. M.O.H., £750.
Sunderland Royal Infirmary.—Cas. O., £150. Also two H.S.'s, each £120.
Surrey County Council Mental Hospital's Service.—Jun. Asst. M.O.'s, each £350.
Swanley, Kent, Hosp. Convalescent Homes, Parkwood.—Res. M.O., at rate of £200.
Swansea, Adelina Patti Hosp.—H.P., at rate of £150.
Swansea General and Eye Hosp.—Cas. O., at rate of £150–£175.
Swindon Borough.—Deputy M.O.H. and Asst. School M.O., £600.
Taunton and Somerset Hosp.—H.S., at rate of £100.
Torquay, Torbay Hosp.—H.P. and H.S., each £175.
Victoria Hosp. for Children, Tite-street, S.W.—Cas. O., at rate of £200.
Wallasey, Victoria Central Hosp.—Jun. H.S., £150.
West Bromwich, Hallam Hosp.—H.P., at rate of £200.
Western Ophthalmic Hosp., Marylebone-road, N.W.—Jun. Res. H.S., £100.
Westminster Hosp., Broad Sanctuary, S.W.—Asst. M.O. in X Ray and Electrical Dept.
Whitechapel Clinic, Turner-street, E.—Asst. Pathologist, £500.
Wickford, Essex, Runwell Hosp.—Asst. Res. Physician, £350.
Winchester, Royal Hampshire County Hosp.—H.S., at rate of £125.
Wolverhampton Royal Hosp.—H.S.'s, each at rate of £100.
Woolwich and District War Memorial Hosp., Shooter's Hill, S.E.—H.P. and H.S., each at rate of £100.
York Dispensary.—Res. M.O., £175.

The Chief Inspector of Factories announces vacancies for Certifying Factory Surgeons at Newport (Monmouth), Edgware (Middlesex), Paisley (Renfrew), Kilbride (Renfrew), and St. Austell (Cornwall).

Medical Referee under the Workmen's Compensation Act, 1925, for the Dewsbury, Leeds, Otley, and Wakefield County Court Districts (Circuit No. 14). Applications should be addressed, the Private Secretary, Home Office, Whitehall, London, S.W.1, before April 26th.

Medical Diary

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.
MONDAY, April 12th.
United Services. 4.30 P.M. Annual General Meeting. Surg. Commander J. C. Souter: Fungus Infection of the Skin of the Feet.
TUESDAY.
Psychiatry. 8.30 P.M. Dr. C. P. Symonds: Mental Disorder following Head Injury.
FRIDAY.
Physical Medicine. 3.30 P.M. (St. John Clinic and Institute of Physical Medicine, Ranelagh-road, S.W.) Annual General Meeting. 4.30 P.M. Demonstrations and cases.
Obstetrics and Gynæcology. 8 P.M. Mr. Everard Williams: Infection in the Cervix Uteri. Dr. R. A. Wilson (New York): Prevention of Asphyxial Death in the Newborn (with film).
Radiology. 8.30 P.M. Dr. Courtney Gage and Dr. S. Cochrane Shanks: Lesions and Special Methods of Investigation of the Alimentary Tract. Dr. R. S. Paterson and Dr. G. B. Bush will also speak.

BRITISH INSTITUTE OF RADIOLOGY, 32, Welbeck-street, W.
THURSDAY, April 15th.—8 P.M., Dr. M. H. Jupe: The Reaction of the Bones of the Skull to Intracranial Lesions.

HARVEIAN SOCIETY.
THURSDAY, April 15th—8.30 P.M. (26, Portland-place, W.), Dr. John Taylor: Some Causes of Sudden Death—Common and Uncommon—from the Medico-Legal Standpoint.

HUNTERIAN SOCIETY.
MONDAY, April 12th.—8.30 P.M. (Simpson's Restaurant, Cheapside), Annual General Meeting. Dr. L. Haden Guest: Air-raid Precautions.

SOCIETY FOR THE STUDY OF INEBRIETY.
TUESDAY, April 13th.—4 P.M. (11, Chandos-street, W.), Dr. John Dent: The Environmental Factors in the Causation and Prevention of Alcoholism.

NORTH LONDON MEDICAL AND CHIRURGICAL SOCIETY, Royal Northern Hospital, Holloway-road, N.
FRIDAY, April 16th.—9.15 P.M., clinical evening.

PADDINGTON MEDICAL SOCIETY.
TUESDAY, April 13th.—9 P.M. (Great Western Royal Hotel, Paddington), Dr. T. C. Hunt: The Abdominal Quartette (Colon, Appendix, Stomach, and Gall-bladder).

SOUTH-WEST LONDON MEDICAL SOCIETY.
WEDNESDAY, April 14th.—9 P.M. (Bolingbroke Hospital, Wandsworth Common), Mr. Claud Mullins: Marriage, the Doctor, and the Police-court.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn-fields, W.C.
MONDAY, April 12th.—5 P.M., Mr. Philip Wiles: Postural Deformities of the Antero-posterior Curves of the Spine. (Hunterian lecture.)
WEDNESDAY and FRIDAY.—5 P.M., Dr. John Beattie: The Anatomical and Physiological Relations of the Hypothalamus and Pituitary Gland. (Arris and Gale lectures.)

BRITISH POSTGRADUATE MEDICAL SCHOOL, Ducane-road, W.
MONDAY, April 12th.—2.30 P.M., Dr. C. W. Buckley: Arthritis.
WEDNESDAY.—Noon, clinical and pathological conference (medical). 2.30 P.M., Dr. Gray: Diagnosis of Malignancy. 3.15 P.M., clinical and pathological conference (surgical). 4 P.M., Mr. J. E. H. Roberts: Surgery of the Chest. 4.30 P.M., Dr. W. E. Gye: Experimental Cancer Research.
THURSDAY.—Noon, clinical and pathological conference (obstetrical and gynæcological). 2.30 P.M., Dr. Duncan White: Radiological Demonstration. 3.30 P.M., Mr. A. K. Henry: Demonstrations of the Cadaver of Surgical Exposures. 3.30 P.M., Mr. Wilfred Shaw: Irregular Uterine Hæmorrhage.
FRIDAY.—2 P.M., operative obstetrics. 3 P.M., department of gynæcology, pathological demonstration.
Daily, 10 A.M. to 4 P.M., medical clinics, surgical clinics and operations, obstetrical and gynæcological clinics and operations.

WEST LONDON HOSPITAL POST-GRADUATE COLLEGE, Hammersmith, W.
MONDAY, April 12th.—10 A.M., Dr. Post: X Ray Film Demonstration, skin clinic. 11 A.M., surgical wards. 2 P.M., operations, surgical and gynæcological wards, medical, surgical, and gynæcological clinics. 4.15 P.M., Mr. Arnold Walker: Breech Presentations.
TUESDAY.—10 A.M., medical wards. 11 A.M., surgical wards. 2 P.M., operations, medical, surgical, and throat clinics. 4.15 P.M., Mr. Hamblen Thomas: Rhinitis, including Hay-fever.
WEDNESDAY.—10 A.M., children's ward and clinic. 11 A.M., medical wards. 2 P.M., gynæcological operations, medical, surgical, and eye clinics. 4.15 P.M., Mr. Gibb: Demonstration of Eye Cases.
THURSDAY.—10 A.M., neurological and gynæcological clinics. Noon, fracture clinic. 2 P.M., operations, medical, surgical, and genito-urinary and eye clinics.
FRIDAY.—10 A.M., medical wards, skin clinic. Noon, lecture on treatment. 2 P.M., operations, medical, surgical, and throat clinics.
SATURDAY.—10 A.M., children's and surgical clinic. 11 A.M., medical wards.
The lectures at 4.15 P.M. are open to all medical practitioners without fee.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.
MONDAY, April 12th, to SATURDAY, April 17th.—ROYAL EYE HOSPITAL, St. George's-circus, S.E., afternoon course in ophthalmology.—Wed. and Thurs., plastic surgery course at various hospitals.—PARK HOSPITAL, Hither-green, S.E. Sat. and Sun. course in infectious diseases.—These courses are open only to members of the Fellowship.

NATIONAL HOSPITAL FOR DISEASES OF THE HEART, Westmoreland-street, W.
TUESDAY, April 13th.—5.30 P.M., Dr. T. F. Cotton: Some Clinical Aspects of Myocardial Disease.

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C.
THURSDAY, April 15th.—2 P.M., Dr. Reginald Lightwood: Interpretation of Splenic Enlargement. 3 P.M., Dr. A. Signy: Modern Aspect of Diphtheria.
Out-patient clinics daily at 10 A.M. and ward visits at 2 P.M.

HOSPITAL FOR EPILEPSY AND PARALYSIS, Maida Vale, W.
THURSDAY, April 22nd.—3 P.M., Dr. Wyllie: Demonstration.

ST. JOHN CLINIC AND INSTITUTE OF PHYSICAL MEDICINE, 42, Ranelagh-road, S.W.
FRIDAY, April 16th.—4.30 P.M. Demonstrations of cases by members of the visiting staff.

MANCHESTER ROYAL INFIRMARY.
TUESDAY, April 13th.—4.15 P.M., Dr. A. Ramsbottom: Infections of the Gall-bladder.
FRIDAY.—4.15 P.M., Mr. R. L. Newell: Demonstration of Surgical Cases.

GLASGOW POST-GRADUATE MEDICAL ASSOCIATION.
WEDNESDAY, April 14th.—4.15 P.M. (Lock Hospital), Dr. David Watson: Venereal Disease in Women.

NOTES, COMMENTS, AND ABSTRACTS

MUSIC IN THE FACTORY

(BY AN OCCASIONAL CONTRIBUTOR)

In tackling seriously the subject of boredom in industrial workers the Industrial Health Research Board [1] has undoubtedly come to grips with one of the major problems of modern life for here, at bottom, lies the secret of strikes, revolutions, wars and the rumours of wars. The bulk of humanity have had to sell their birthright for a mess of pottage and no wonder they have proved fractious and discontented bargainers. The replacement of craftsmanship by mass production has bereft many of the individuality which was a sufficient compensation for poverty. The carver of Chippendale chairs or the moulder of Chelsea figures had probably to work long, hard and for little gain, but he had also the never-failing satisfaction of seeing his own work and of knowing that it was good.

The investigations dealt with in a recent report on boredom in repetitive industry are conceived on the simple lines no doubt essential in the preliminary study of such a complex problem as this. The subjects of the investigations were four groups of factory girls working at chocolate packing, cracker making, and "tying small blocks in calico." These jobs are no doubt deadly dull, but not more so than those which engage the majority of factory workers. A short questionnaire was devised, the answers to which were calculated to give some general idea of the psychological reactions of the worker to her work. The outcome of the inquiry can be anticipated, but it is none the less pitiable. Of 355 workers, only 3 per cent. expressed no sign of boredom, 33 per cent. were slightly affected, 38 per cent. experienced a moderate degree, and 26 per cent. suffered severely. Temperamental differences accounted for a good deal of variation in the amount of boredom suffered, and, understandably enough, the more intelligent type of worker suffered most severely. It is possible that women, who look elsewhere than in hired work for the fulfilment of their lives, suffer more than men, but many of them have their day-dreams for compensation. Men on the other hand are more given to kicking against the pricks and they shoulder their burden knowing it will stay with them while health and life last. The writers of the report study many causes of discontent among workers. Questions of promotion, security, supervision, wages, hours of work, &c., have all their contributory effects, but the radical remédies for these are matters too inflammable to be the subject of official reports. The investigators make, however, one valuable positive contribution to the prevention of boredom in industry. They found that gramophone records played at chosen periods during the day had a marked alleviating effect on the symptoms. Almost all the workers, we are told, "responded to the music by an increased output." The average increase in output while the music was actually being played was 6·2 to 11·3 per cent.

An inquirer of another age might well wonder why the ingenuity of psychologists could not have devised a more delicate test for human contentment than an increased output of chocolate boxes, but we are in a century when the still small voices of humanity are liable to be drowned in the clash of machinery and the rattle of cash registers. Music the antidote to misery—an old theme with ever new application! The caged linnet sings away its captivity. The chain gangs and the galley slaves sang their rhythmic catches as they strained and sweated. The old mariners found their shanties helped them to weigh the anchor and to endure their hardships. The negroes in the cotton fields, no doubt, increased their output in bales with their plantation songs and the Volga boatmen who, if music and elementary geography go for anything, lived a hard and bitter life, probably got a 10 per cent. increase in speed by singing their stirring boat-song. But now when division of labour is an inexorable law and the discipline of the factory has advanced beyond that of the chain gang, the music too is no longer individual but must be provided by mechanical devices.

There is music like the Liebestod from *Tristan* or the last movement of the Fifth Symphony which must be received head between hands and in semi-coma. The investigators who, no doubt, had shareholders to consider made no experiments with this kind of music. Of the types they tried "light orchestral music" seems to have had least effect and this we take as welcome evidence that our factory girls, though sore beset, have still sturdy souls. It was the youthful and stimulating music which goes by the name of "jazz" or "rhythm" that was found to be the best antidote to boredom. "It is generally agreed" say our investigators gravely, "that rhythm induces a pleasant emotional effect which acts as a more favourable background for production." But we should like to have more precise details as to the nature of the successful music. The investigators give the impression that a studious and sheltered life may have made them insensible to the finer distinctions of rhythmic music. It is not enough to classify their records as waltzes, one-steps, or fox-trots. There are fox-trots and fox-trots, and dance bands and dance bands, and of this an industrial psychologist could convince himself if he compared the incomes of the "kings of jazz." Is the output as great with the music of Duke Ellington as with that of Irving Berlin? We can imagine shuffling chocolates to Ellington's neolithic measures, but not packing them. The astute psychologists of Radio-Normandie seem to find that the Blue Danube and the Lily of Laguna, old as they are, have a specially potent effect in helping mothers of families through their daily chores and in keeping them diligently dosing their children with vitamins, laxatives, and antacids. The Blue Danube may suit the mangle yet fail with "tying small blocks in calico." There is obviously a field for further inquiry here and the services of Mr. Charles Cochrane, Mr. Ambrose, or Mr. Roy Fox might be advantageously coöpted for the investigation.

But, when all is said, this question of boredom in the modern world is a desperately serious and important affair and well worth the continued attention of the Industrial Health Research Board. There is much to be done and it is satisfactory to see that a good start has been made. The medical man, himself a worker who, whatever his misfortunes, rarely knows boredom, may well be moved, by the picture given in this report of the soul under the industrial system, to see, as it were, the naked nerve touched by the experimenter's probe. But lest he look back too regretfully to the simple life of the old world, let us quote from another observer as impersonal as the writer of government reports and infinitely more callous:—

"... certains animaux farouches, des mâles et des femelles, répandus par la campagne, noirs, livides et brûlés du soleil, attachés à la terre qu'ils fouillent et qu'ils remuent avec une opiniâtreté invincible: ils ont comme une voix articulée; et quand ils se lévent sur leurs pieds, ils montrent une face humaine; et en effet, ils sont des hommes."

And there were no gramophones, radios, cinemas, or football pools under the old régime.

[1] Fatigue and Boredom in Repetitive Work. By S. Wyatt and J. N. Langdon (assisted by F. G. L. Scott). Medical Research Council: Industrial Health Research Board. Report No. 77. H.M. Stationery Office. 1937. Pp. 77. 1s. 3d.

NOISY MOTOR VEHICLES

IN 1934 the Minister of Transport set up a Departmental Committee to advise him on the measures that should be taken to alleviate noise from motor vehicles. The Committee, of which Mr. G. W. C. Kaye, D.Sc., of the National Physical Laboratory is chairman, embarked on a programme of research on all classes of mechanically propelled vehicles both under normal conditions and under somewhat extreme conditions of misuse. In pursuance of this programme, an elaborate series of tests were undertaken by the National Physical Laboratory.

The Committee has issued three reports in all. In the first two, published in 1935 and 1936, newly manufactured vehicles of all classes came up for review, and the Minister was recommended to consider the advisability of setting up a standard of noise to which all such vehicles should conform under certain specified conditions of test. In terms of the new unit of loudness, the standard suggested was 90 phons at a distance of 18 feet sideways from the vehicle or 25 feet to the rear. This is, in point of fact, a very moderate demand and one to which the majority of motor-cars already conform, while other vehicles, including sports cars and lorries, can readily be made to do so. Motor-cycles present greater difficulties, but the industry is already trying to overcome them; and to give it breathing-space, the Committee proposed that motor-cycles should be allowed 5 phons' grace for a period of two years.

The third report of the Committee, which has just been issued by His Majesty's Stationery Office (1*s.*), deals with "old" or "used" vehicles on the road. Loudness measurements have been conducted under a variety of conditions on some 600 vehicles typical of the chief types. The results fall within the limits 70 to 105 phons, the latter value corresponding to that of a noisy road drill. The Committee now propose that the noise limit on the road should be 95 phons, which is roughly equivalent to the noise in a tube train, the relevant tests being identical with those suggested for new vehicles. It is proposed that this limitation of loudness should apply at first only to vehicles registered after an appointed day, but that two years thereafter it should apply to vehicles of any age.

It is clear that the modest requirements suggested by the Committee in its several reports would, if given effect, achieve its first objective of suppressing the outstanding noise pests on the road. In the future the industry, which is free to solve its problems in its own way, should not only be able to meet the proposed noise limits with comparative ease, but should enable the limits to be lowered as time goes on. The Committee, which was given a difficult task, has earned the thanks of those who wish to create acoustical decency on the roads. At the Minister's request it is now investigating the noise of motor-horns, so as to advise him whether action might usefully be taken to abolish the more offensive types.

GUIDANCE TO CAREERS

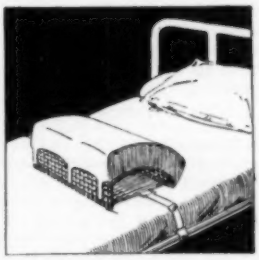
AN exposition of the methods of vocational guidance [1] designed for the layman should dispel any fears about the limitations of cut and dried scientific method as a means of estimating the complex potentialities of the adolescent. Applicants for vocational guidance are not, as is popularly supposed, guided on the results of a few isolated tests. The results of the test material (which is in itself exceedingly varied) are in each case considered in conjunction with extensive reports from parents, teachers, and in some instances from the child himself. Personal interviews are given, and the report finally produced aims at constructive advice with regard not only to the candidate's ability, but to his health, financial circumstances, and personal inclinations. The reader is left with the conviction that vocational guidance is still and perhaps always will be less a science than an art—half intelligent interpretation of given facts and half sympathetic understanding. The first part of the handbook explains test material and methods of testing, grouped under tests for special ability. This is followed by a chapter given up to the detailed analysis of the cases of John Jones and Elizabeth Brown. These standard cases do much to explain the methods followed by the National Institute of Industrial Psychology, but could with advantage be shortened in presentation. The section on occupational requirements should prove useful to advisers on careers, and the tables of qualities and abilities required in various careers (which are plotted against the average scholastic level at the school certificate stage—16 to 17 years) are of special interest.

It is a difficult task to present a vast body of highly specialised knowledge in a form which the average layman can understand and digest. More careful attention to the plates would have added to public interest; those included provide "close-ups" of vocational guidance officers and children being tested but do not really make the test material clear. In a future edition simple diagrams or photographs of the test boards in surface view would be welcome additions. There is, however, plenty of absorbing detail in the text, which is full of information.

[1] The Handbook of Vocational Guidance. By C. A. Oakley, B.Sc. Eng., Ed.B., Scottish Divisional Director of the National Institute of Industrial Psychology; and Angus Macrae, M.A., M.B., lately Head of the Vocational Guidance Department of the Institute. London: University of London Press. 1937. Pp. 337. 10*s.* 6*d.*

THE STAYPUT BED SUPPORT

THE support here illustrated is primarily a substitute for the pillow tied under the knees of a patient in Fowler's position. It is also said to be useful in nursing a gynæcological, heart, or eye case and after confinement. It consists of a stout but light metal frame, over which is fitted a square pad of spongey Dunlopillo rubber. The edges of the frame and the weight of the patient are generally enough to prevent the support from slipping down the bed, but if needed there are linen bands which can be clipped to the bed-frame. When not required for the sitting position the support may be used as a pillow, foot-rest, or arm-rest, or the pad when detached itself makes a comfortable pillow. Both the frame and the pillow can be disinfected but each has a cloth cover that can be quickly removed for washing.



The support is made by the Stayput Bed Support Co., 47, High-street, Camden Town, London, N.W.

A CLASSICAL MANUAL ON CHILD WELFARE

MANY years' work at the pioneer infant welfare centre opened at the St. Marylebone General Dispensary in 1906 gave Mrs. Langton Hewer the experience embodied in a little book [1] which has now reached its twenty-first edition. Being herself unable to undertake the work of revising this edition Mrs. Hewer has handed it over to Dr. Sophia Friel (also connected with the Marylebone Welfare Centre) who has successfully brought it up to date without materially altering its original character. Much information is packed into its 167 pages, and advice can here be found on most matters germane to

[1] Our Baby: For Mothers and Nurses. 21st edition. By Mrs. J. Langton Hewer, S.R.N., C.M.B., late hospital ward sister. Revised by Sophia Seekings Friel, M.D., B.S., D.P.H. Bristol: John Wright and Sons, Ltd.; London: Simpkin Marshall Ltd. 1936. Pp. 167. 2*s.* 6*d.*

mothercraft ranging from the onset of pregnancy to the character training of toddlers. It is essentially a practical book and the author does not theorise, but in places it is perhaps too complicated and full of alternative suggestions for the average mother or child's nurse; but monthly and welfare nurses, for whom also presumably it is written, will not find this a defect. In the chapter on infant feeding it is surprising that whereas such things as peptonised feeding are described in some detail no mention is made of lactic acid milk. Excellent emphasis is laid upon the importance to the infant of fresh moving air and the correct balance of rest and exercise. The last few chapters are devoted to a discussion of childish ailments, accidents, and illnesses, and contain much sound advice. There is a chapter dealing with the care of infants in the tropics, a short bibliography, and a good index.

We are informed that nearly two hundred thousand copies of this book have been sold; it remains one of the best of its kind.

MEDICAL ACTIVITIES FOR LAY READERS

THE increasing popular demand for superficial knowledge on various topics fostered by certain organs of the press and not altogether discouraged by the B.B.C. has produced a spate of small books of which a typical example is one entitled Science Fights Death.[1] Herein the progress and problems of modern medicine are thinly though not inaccurately discussed in non-technical language. Bacteriology and infectious diseases, parasitology, virus diseases, the endocrines, plastic surgery, industrial and blood diseases, and the cancer problem are some of the things touched upon; the author is to be forgiven if he has chosen the more cheerful and dramatic themes, for it is well known that laymen are always more interested in the potentialities of a subject than in its limitations. Moreover, the doctor lured, however unwillingly perhaps, at a dinner-party to talk about his job, might do worse than take this book as a model of how to "put over" snippets of information in a manner calculated not to bore the casual listener.

NEW PREPARATIONS

ACROSONE.—The advantages claimed for this antiseptic are that it is neither poisonous, irritating, nor corrosive, giving a relatively clear solution in water and having a Rideal-Walker coefficient of 13. It is slightly oily, and this discourages adhesion of dressings to wounds. For the sterilisation of instruments immersion in a 20 per cent. solution for ten minutes is said to suffice. The use of Acrosone is also advised for cleaning septic wounds, for vaginal douching, for sterilisation of hands and skin, for rinsing ulcerated mouths, and for treating cutaneous sepsis. It is made by James Woolley Sons and Co., Ltd., Victoria Bridge, Manchester 3.

BILRON is a mixture of iron and bile acids in the form of ferric bile acids. It is soluble in alkaline solution, but almost insoluble in water and acid media, and it may therefore be taken by mouth without special enteric coating. Its administration is suggested wherever stimulation of secretion of bile is desired—e.g., in dyspepsia due to hepatic insufficiency and in some forms of constipation and of migraine—and also during surgical drainage of the biliary tract. The manufacturers of Bilron (Eli Lilly and Co., Ltd., 2, Dean-street, London, W.1), refer to unpublished observations by Kohlstaedt and Rosenak on the usefulness of iron bile salts in cases of cholecystitis without stones. The product is sold in 5-grain Pulvules (filled capsules).

SOLUSEPTASINE, a product of Pharmaceutical Specialities (May and Baker) Ltd., Dagenham, is disodium *p* (γ phenylpropylamino) benzenesulphonamide-α, γ-disulphonate. It is supplied in ampoules in 5 per cent. solution and recommended by the makers for intravenous or intramuscular injection in the treatment of severe streptococcal infection.

VITEOLIN is the name now given by Glaxo Laboratories Ltd. (Greenford, Middlesex) to their wheat-germ oil extract. They have issued a booklet entitled "Vitamin E" which gives an account of the clinical use of this vitamin especially in the treatment of repeated and threatened abortion. The extract is described as a twenty-five-fold concentration of the vitamin E in wheat-germ oil, and it is put out in 3-minim capsules.

ORHEPTAL.—E. Merck, of Darmstadt, have prepared a new tonic for use in cases of secondary anæmia, during convalescence and in conditions of weakness and loss of tone. Besides a concentrated liver extract, it contains ferric ammonium citrate, cupric chloride, tincture of nux vomica, sodium and manganese glycerophosphate, caffeine, and small quantities of quinine, bitters, alcohol, and syrup. It is obtainable in this country from Savory and Moore Ltd., 61, Welbeck-street, London, W.1.

A pamphlet on "Ovarian Hormones in Clinical Practice" is issued by BOOTS PURE DRUG CO., LTD. (Nottingham). It gives particulars of the Boots preparations of œstrone benzoate (Ovostab) and corpus luteum hormone (Luteostab) and illustrates the use of these substances by quotations from published papers.

WANTED, A CASE OF BILIARY FISTULA.—M.D. ABERD., who is investigating the effect on the liver secretion of various medicinal waters, would be glad to find a case of biliary fistula willing to undergo such a test. All expenses would be paid.

Births, Marriages, and Deaths

BIRTHS

AIRD.—On April 4th, at Blackpool, the wife of Dr. J. Wilson Aird, of a son.

BLACK.—On April 1st, 1937, at Leeds, to Stella, wife of George Black, F.R.C.S., of 26, Park-square, Leeds—a son.

CONSTAD.—On April 3rd, at Welbeck-street, W., the wife of Dr. Victor Constad, of a daughter.

DANNATT.—On March 24th, at the Middlesex Hospital, W., the wife of Mr. R. M. Dannatt, F.R.C.S. Eng., of a son.

HARTLEY.—On March 29th, at Rye, Sussex, the wife of Dr. J. L. Hartley, of a daughter.

JAMES.—On March 25th, the wife of T. G. Illtyd James, F.R.C.S., of a son.

JOHNSTONE.—On April 2nd, at Leicester, the wife of Mr. A. S. Johnstone, F.R.C.S. Edin., of a daughter.

MCCONNEL.—On April 2nd, at Welbeck-street, W., the wife of Dr. R. W. McConnel, Wendover, Bucks, of a son.

TURNER.—On March 23rd, at Bracknell, Berks, the wife of Dr. Ronald Turner, of a son.

MARRIAGES

BETTLEY—SANDERS.—On March 31st, at St. Peter's, Croydon, F. Ray Bettley, M.D., of Croydon, to Mary Stewart, only child of Robert Stewart Sanders, formerly of Purley.

BOWES—WHITTON.—On March 31st, at the Church of the Annunciation, Bryanston-street, W., Robert William Wallace Bowes, M.A., M.R.C.S., of Diss, Norfolk, to Olga Mary Whitton, M.Com. (Vict.), Seymour-street, London, W.

LANGTON—WHITE.—On April 3rd, at St. Mary's Church, Scarborough, Peregrine Stephen Brackenbury Langton, M.B., Medical Superintendent of the Royal Earlswood Institution, Redhill, Surrey, to Vera Dennis White, youngest daughter of Mr. F. A. White, of Scarborough.

DEATHS

BRISCO-OWEN.—On March 24th, Ella Gertrude Brisco-Owen, L.M.S.S.A.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

[1] Science Fights Death. By D. Stark Murray, B.Sc., M.B., Ch.B. London: Watts and Co. 1936. Pp. 149. 2s. 6d.